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PARTS 140 TO 155

Revised as of October 1, 1990

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PARTS 140 TO 155

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Cite this Code: **CFR**

To cite the regulations in this volume use title, part and section number. Thus, 6 CFR 146.01–1 *refers to title 46, part 146, section 01–1.*

Explanation

The Code of Federal Regulations is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. The Code is divided into 50 titles which represent broad areas subject to Federal regulation. Each title is divided into chapters which usually bear the name of the issuing agency. Each chapter is further subdivided into parts covering specific regulatory areas.

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Each volume of the Code is revised at least once each calendar year and issued on a quarterly basis approximately as follows:

Title 1 through Title 16	as of January 1
Title 17 through Title 27	as of April 1
Title 28 through Title 41	as of July 1
Title 42 through Title 50	as of October 1

The appropriate revision date is printed on the cover of each volume.

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The contents of the Federal Register are required to be judicially noticed (44 U.S.C. 1507). The Code of Federal Regulations is prima facie evidence of the text of the original documents (44 U.S.C. 1510).

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The Paperwork Reduction Act of 1980 (Pub. L. 96-511) requires Federal agencies to display an OMB control number with their information collection request. Many agencies have begun publishing numerous OMB control numbers as amendments to existing regulations in the CFR. These OMB numbers are placed as close as possible to the applicable recordkeeping or reporting requirements.

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Martha L. Girard,
Director,
Office of the Federal Register.

October 1, 1990.

THIS TITLE

Title 46—Shipping is composed of nine volumes. The parts in these volumes are arranged in the following order: Parts 1-40, 41-69, 70-89, 90-139, 140-155, 156-165, 166-199, 200-499 and 500-end. The first seven volumes containing parts 1-199 comprise Chapter I—Coast Guard, Department of Transportation. The eighth volume containing parts 200 to 499 includes Chapter II—Maritime Administration, Department of Transportation and Chapter III—Coast Guard (Great Lakes Pilotage), Department of Transportation. The ninth volume containing part 500-End includes Chapter IV—Federal Maritime Commission. The contents of these volumes represent all current regulations codified under this title of the CFR as of October 1, 1990.

Subject indexes appear for Subchapter B—Merchant Marine Officers and Seamen, Subchapter C—Uninspected Vessels, and Subchapter D—Tank Vessels following the subchapters in parts 1-40; for Subchapter F—Marine Engineering following the subchapter in parts 41-69; for Subchapter H—Passenger Vessels following the subchapter in parts 70-89; for Subchapter I—Cargo and Miscellaneous Vessels, Subchapter I-A-Mobile Offshore Drilling Units, and Subchapter J—Electrical Engineering following the subchapters in parts 90-139; for Subchapter S—Subdivision and Stability and for Subchapter T—Small Passenger Vessels (Under 100 Gross Tons) following the subchapters in parts 166-199.

Redesignation tables for Chapter I—Coast Guard appear in the Finding Aids section of the volumes containing parts 1-40, parts 41-69, parts 70-89, parts 90-139, parts 140-155, parts 156-165, and parts 166-199. A redesignation table for Chapter II—Maritime Administration appears in the Finding Aids section of the volume containing parts 200-499. A redesignation table for Chapter IV—Federal Maritime Commission appears in the Finding Aids section of the volume containing part 500-End.

For this volume Sheli Fleming was Chief Editor. The Code of Federal Regulations publication program is under the direction of Richard L. Claypoole, assisted by Alomha S. Morris.

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EDITORIAL NOTE: Nomenclature changes to Chapter I appear at 45 FR 64586, Sept. 30, 1980 (CGD 80-123).

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AUTHORITY: 46 U.S.C. 3306, 3703; 49 U.S.C. App. 1904; 49 CFR 1.45, 1.46; § 146.01-5 also issued under the authority of 44 U.S.C. 3507.

SOURCE: Amdt. 176-1, 41 FR 28116, July 8, 1976, unless otherwise noted.

CROSS REFERENCE: For regulations of the Department of Transportation relating to the transportation of explosives and other dangerous articles, see 49 CFR Parts 171-179.

Subpart 146.01—Preface

§ 146.01-1 Purpose of regulations.

The purpose of the regulations in this subchapter is to promote safety in the handling, stowage, storage and transportation of military explosives as defined herein, on board vessels on any navigable waters within the limits of the jurisdiction of the United States including its territories and possessions and to make more effective the provisions of the International Convention for the Safety of Life at Sea, 1974, relative to the carriage of dangerous goods.

[CGD 90-008, 55 FR 30663, July 26, 1990]

§ 146.01-3 Plan of regulations.

This part prescribes the requirements of the Department of Transportation governing the transportation of military explosives on board vessels. Regulations governing the transportation of other hazardous materials in packages on board vessels are in 49 CFR parts 171-189.

§ 146.01-4 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50380, Dec. 6, 1989]

§ 146.01-5 OMB control numbers assigned pursuant to the Paperwork Reduction Act.

(a) *Purpose.* This section collects and displays the control numbers assigned to information collection and recordkeeping requirements in this subchapter by the Office of Management and Budget (OMB) pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). The Coast Guard intends that this section comply with the requirements of 44 U.S.C. 3507(f) which requires that agencies display a current control number assigned by the Director of the OMB for each approved agency information collection requirement.

(b) *Display.*

46 CFR part or section where identified or described	Current OMB control no.
§ 146.02-20	2115-0054
§ 146.29-13	2115-0013

[49 FR 38121, Sept. 27, 1984, as amended by CGD 84-044, 53 FR 7749, Mar. 10, 1988; CGD 88-072, 53 FR 37570, Sept. 27, 1988]

Subpart 146.02—General Regulations

§ 146.02-1 Scope of regulations.

The regulations in this subpart:

(a) Set forth the requirements that shall be observed in the preparation and packing of military explosives for shipment or storage on board vessels;

(b) Set forth the descriptive name, shipping name, requirements relative to certification, containers, marking, labeling, information required on bills of lading or other shipping papers, manifests or cargo stowage plans for shipments of military explosives on board vessels;

(c) Set forth the provisions under which permitted military explosives within the scope of the definitions given herein, may be accepted, handled, stored, stowed, or transported on board vessels, and with respect to rejection and report of faulty containers and the disposition of any military explosives found to be in an unsafe condition when on board a vessel;

(d) Establish such other requirements as may be necessary to make effective the safe transportation of military explosives on board vessels.

§ 146.02-2 Application to vessels.

(a) Except as provided in paragraph (b) of this section, this subpart applies to each domestic or foreign vessel when in the navigable waters of the United States, regardless of its character, tonnage, size, or service, and whether self-propelled or not, whether arriving or departing, underway, moored, anchored, aground, or while in dry dock.

(b) This subpart does not apply to:

(1) A public vessel not engaged in commercial service;

(2) A vessel constructed or converted for the principal purpose of carrying flammable or combustible liquid cargo in bulk in its own tanks, when only carrying these liquid cargoes;

(3) A vessel of 15 gross tons or smaller when not engaged in carrying passengers for hire;

(4) A vessel used exclusively for pleasure;

(5) A vessel of 500 gross tons or smaller when engaged in fisheries;

(6) A tug or towing vessel except when towing another vessel having explosives, flammable liquids or flammable compressed gas on board on deck in which case the tug or towing vessel shall make such provisions to guard against and extinguish fire as the Coast Guard may prescribe; or

(7) A cable vessel, dredge, elevator vessel fireboat, icebreaker, pile driver, pilot boat, welding vessel, salvage vessel, or wrecking vessel.

§ 146.02-5 Responsibility for compliance.

Unless this subpart specifically provides that another person must perform a duty, each carrier, including a connecting carrier, shall comply with all applicable regulations in this subpart, and shall thoroughly instruct his employees in relation thereto.

§ 146.02-6 Enforcement.

(a) An enforcement officer of the U.S. Coast Guard may at any time and at any place, within the jurisdiction of the United States, board any vessel for the purpose of enforcement of this subpart.

(b) Under the authority of 46 U.S.C. 170(13) and in the manner provided therein, a collector of customs may detain a vessel which is in violation of this subpart.

§ 146.02-6a Assignment and certification.

(a) The National Cargo Bureau, Inc., is authorized to assist the Coast Guard in administering this part with respect to the following:

(1) Inspection of vessels for suitability for loading military explosives;

(2) Examination of stowage of military explosives;

(3) Making recommendations for stowage requirements of military explosives; and

(4) Issuance of certificates of loading setting forth that the stowage of military explosives is in accordance with the requirements of 46 U.S.C. 170 and this part.

(b) A certificate of loading issued by the National Cargo Bureau, Inc., may be accepted by the Coast Guard as prima facie evidence that the cargo is stowed in conformity with the requirements of 46 U.S.C. 170 and this part.

§ 146.02-12 Inspection of cargo.

(a) *Manned vessels.* (1) The master of a vessel transporting military explosives shall cause an inspection of each hold or compartment containing military explosives to be made after stowage is complete, and at least once every 24 hours thereafter, weather permitting, in order to ensure that the cargo is in a safe condition and that no damage caused by shifting, spontaneous heating, leaking, sifting, wetting, or other cause has been sustained by the vessel or its cargo since loading and stowage. This requirement does not require freight containers or individual barges to be opened. A vessel's holds equipped with smoke or fire detecting systems, having an automatic monitoring capability, need not be inspected except after stowage is complete and after periods of heavy weather.

(2) The master shall cause an entry to be made in the vessel's deck log book for each inspection of the stowage of military explosives performed.

(b) *Unmanned and magazine vessels.* An inspection of the cargo must be made after stowage has been completed to ensure that stowage has been accomplished properly and that there are no visible signs of damage to any packages or evidence of heating, leaking, or sifting. This inspection must be made by the individual who is responsible to the carrier and who is in charge of loading and stowing the cargo on the unmanned vessels or the individual in charge in the case of a magazine vessel.

(c) The master of each ocean-going vessel carrying military explosives shall, immediately prior to entering a port in the United States, cause an inspection of that cargo to be made.

(d) When inspecting a cargo of military explosives capable of evolving flammable vapors, any artificial means of illumination must be of an explosion-proof type.

§ 146.02-14 Acceptance of damaged or leaking packages.

A carrier may not transport by vessel any package that is so damaged as to permit the escape of its contents, that appears to have leaked, or that gives evidence of failure to properly contain the contents unless it is restored or repaired to the satisfaction of the master of the vessel.

§ 146.02-15 Emergency situations.

(a) When an accident occurs on board a vessel involving military explosives, and the safety of the vessel, its passengers or crew are endangered, the master shall adopt such procedures as will, in his judgment, provide maximum safety for the vessel and its crew. When the accident results in damaged packages or the emergency use of unauthorized packagings, these packages may not be offered to any forwarding carrier for transportation. The master shall notify the nearest District Commander, U.S. Coast Guard, and request instructions for disposition of the packages.

(b) Military explosives may be jettisoned only if the master believes this action necessary to prevent or substantially reduce a hazard to human life or reduce a substantial hazard to property.

§ 146.02-16 Rejections of shipments in violation.

(a) A carrier may not knowingly transport by vessel any military explosive offered under a false or deceptive name, marking, invoice, shipping paper or other declaration, or without the shipper furnishing written information about the true nature of the material at the time of delivery.

(b) If a shipment in violation is found in transit, the master of the vessel shall adopt procedures which in his judgment provide maximum safety to the vessel, its passengers and its crew and which are in compliance with § 146.02-15. If the vessel is in port, the material may not be delivered to any party, and the master shall immediately notify the nearest District Commander and request instructions for disposition of the material.

§ 146.02-20 Repairs involving welding or burning.

(a) Except as provided in paragraph (b) of this section, repairs or work involving welding or burning, or the use of power-actuated tools or appliances which may produce intense heat may not be undertaken on any vessel having military explosives on board as cargo.

(b) Paragraph (a) of this section does not apply if the repairs or work are approved by the local Coast Guard Captain of the Port or his authorized representative.

§ 146.02-22 Preservation of records.

(a) When this part requires shipping orders, manifest, cargo lists, stowage plans, reports, or any other papers, documents or similar records to be prepared, the carrier shall preserve them or copies of them in his place of business or office in the United States for a period of one year after their preparation.

(b) Any record required to be preserved must be made available upon request to an authorized representative of the U.S. Coast Guard.

§ 146.02-25 Exemptions and alternative stowage procedures.

(a) Procedures whereby persons subject to the requirements of this part may obtain administrative relief therefrom on the basis of equivalent levels of safety or levels of safety consistent with the public interest are set forth in 49 CFR part 107, subpart B.

(b) When a military explosive is to be loaded on board a vessel and it is shown to the satisfaction of the Captain of the Port for the place where the vessel is being loaded that it is impracticable to comply with a stowage location, handling, or stowage requirement prescribed in this part, the Captain of the Port may authorize in writing the use of an alternative stowage location or method of handling or stowage subject to such conditions as he finds will ensure a level of safety at least equivalent to that afforded by the regulatory requirement concerned.

§ 146.02-35 Situation requiring report.

(a) When a fire or other hazardous condition exists on a vessel transporting military explosives, the master shall notify the nearest District Commander as soon as possible and shall comply with any instructions given by the District Commander.

(b) When an incident occurs during transportation in which military explosives are involved, Hazardous Materials Incident Reports may be required. See 49 CFR 171.15 and 171.16.

(c) If a package, container, portable tank, highway or railroad vehicle containing military explosives is jettisoned or lost, the master shall notify the nearest District Commander as soon as possible of the location, quantity, and type of explosives.

Subpart 146.05—Shipper's Requirements Regarding Packing, Marking, Labeling and Shipping Papers

§ 146.05-1 General requirements.

(a) No person may offer military explosives for transportation on board a vessel unless they are properly classed, described, packaged, marked, labeled, and in the condition for shipment required by this part.

(b) A shipment of military explosives that is not prepared for shipment in accordance with this part may not be offered for transportation on board a vessel. It is the duty of each person who offers military explosives for transportation to instruct each of his officers, agents, and employees having any responsibility for preparing military explosives for shipment as to applicable regulations in this part.

(c) Methods of container manufacture, packing, and storage, that affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or a representative of the U.S. Coast Guard.

§ 146.05-3 Prohibited packaging.

(a) No person may offer for transportation on board a vessel any military explosives in an outside packaging which also contains any substance likely to cause a dangerous evolution of heat or gas or produce corrosive materials.

(b) No person may offer for transportation on board a vessel any military explosives which under conditions normally incident to transportation may polymerize (combines or react with itself) or decompose so as to cause dangerous evolution of heat or gas, unless they are properly stabilized or inhibited. Refrigeration may be used as a means of stabilization only when approved by the Commandant (G-MTH).

[Amdt. 176-1, 41 FR 28116, July 8, 1976, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 146.05–11 Shipper's certification.

Each person who offers military explosives for transportation on board a vessel shall certify in writing that the explosives are being presented for transportation in accordance with this part by printing (manually or mechanically) the following statement on the shipping paper containing the required shipping description:

> This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

NOTE: Preprinted certificates complying with 49 CFR 173.430(a) in effect on June 30, 1976, may be used through June 30, 1979. After June 30, 1979, use of the certificate required by this section is mandatory.

§ 146.05–12 Shipping papers.

(a) A carrier may not transport military explosives on board a vessel unless the explosives are properly described on the shipping papers in the manner prescribed in 49 CFR part 172, subpart C.

(b) A carrier may not transport military explosives on board a vessel unless it has been certified by the shipper in accordance with § 146.05-11.

§ 146.05–15 Marking and labeling.

Each package of military explosives offered for transportation on board a vessel must be marked and labeled in accordance with 49 CFR part 172, subparts D and E respectively.

Subpart 146.09—Cargo Handling and Stowage Devices

§ 146.09–7 Specifications of moisture proofed paper bags.

SPECIFICATION MIN–W10

MOISTURE PROOFED MULTIWALL PAPER BAGS FOR TRANSPORTATION OF QUICKLIME BY WATER

General

1. *Compliance.* Containers must comply with, or may exceed, details of the specifications.

2. *Capacity.* Not over 100 pounds net.

Material

3. *Paper.* Kraft (100% sulfate) paper.

4. *Moisture proofing.* Asphalt or other material equal or superior to asphalt.

Construction

5. (a) *Description.* A multiwall paper bag constructed of not less than four plies, one or more of which will be moisture proofed.

(b) *Assembly of moisture proofed ply.* The assembly of the moisutre proofed ply will be accomplished by combining two sheets of Kraft (100% sulfate) paper having a basis weight of not less than 20 pounds each with not less than 25 pounds of asphalt applied evenly to the paper surface.

(c) *Alternate moisture proofed ply.* Any other moisture proofed Kraft paper of a total basis weight of not less than 40 pounds before treatment, whose moisture proofed qualities are equal or superior to the above asphalt treated paper as determined by the Thwing Vapometer test for moisture-vapor transmission.

(d) *Additional plies.* Remaining plies of the bag will be constructed of Kraft (100% sulfate) paper, each sheet having a basis weight of not less than 40 pounds, and a Kady or Mullen test of 40 pounds per square inch. The combined weight of said remaining plies to be not less than the weights given in the following table:

Approximate weight of contents	*Combined weight of remaining plies in addition to moisture proofed ply described in (5)(b)*
To and including 50 pounds	130 pounds.
51 pounds to and including 80 pounds.	150 pounds.
81 pounds to and including 100 pounds.	170 pounds.

All weights given are on the basis of 480 (24 x 36 inch) sheets.

(e) *Longitudinal seams.* Longitudinal seams made by lapping not less than one inch and pasting.

(f) *Bottom closure.* Bottom closure made by folding and interlapping and pasting; or taped sewed and dipped in a waterproofing compound; *or sewed and taped over stitching.*

(g) *Top closure.* By wire ties consisting of not less than two No. 16 Birmingham wire gauge or heavier wires; or by valve mouth with top of bag folded and interlapped and pasted; or by valve mouth with top of bag taped, sewed and dipped in waterproofing compound; *or sewed and taped over stitching.*

6. *Test.* The finished container, filled and closed, must be capable of withstanding a drop test of 4 feet on the butt without sifting or rupture of any ply.

Marking

7. *In each container.* By marks at least one inch high as follows:

(a) *Min-W10.* This marking shall be understood to certify that the container complies with all specification requirements.

(b) Name and address of maker located above or below the mark specified in (7)(a).

[Order 74, 6 FR 277, Jan. 11, 1941]

§ 146.09-8 Specifications of moisture proofed paper lined burlap bags.

SPECIFICATION MIN-W11

MOISTURE PROOFED PAPER LINED BURLAP BAGS FOR TRANSPORTATION OF QUICKLIME BY WATER

General

1. *Compliance.* Containers must comply with, or may exceed, details of the specifications.

2. *Capacity.* Not over 100 pounds net.

Material

3. *Burlap.* At least equal in equality and strength to 7½ ounce 40 inch (7½/40) Calcutta common burlap. Thread count at least 9 per inch warp and 9 per inch filler.

4. *Paper.* No. 1 Kraft creped. Finished weight of 40 pounds per ream (480 sheets 24 x 36 inch) after creping.

Construction

5. (a) *Description.* Burlap bag lined with a water proofed paper lining.

(b) *Assembly of moisture proofed lining.* The assembly of the moisture proofed lining will be accomplished by combining two plies of creped paper having a finished weight of not less than 40 pounds each, evenly coated between the two plies with asphalt of any desirable type, of minimum 150° F. melting point, over the entire area of paper, with minimum coverage of 110 pounds per ream.

(c) *Assembly of moisture proofed ply and burlap.* The burlap will be lined with the moisture proofed creped paper by cementing together with a suitable latex compounded adhesive to securely attach paper lining to the burlap.

(d) *Stretch of paper lining.* After they are cemented to the burlap the stretch of the paper lining must equal the stretch of the burlap in the direction of the warp and filling and equal to 10 percent in a diagonal direction.

(e) *Seams.* Bags must be made with cemented center seams and taped bottoms to make them sift proof and airtight and to provide strength at least equal to the bag material.

(f) *Closure.* Bags to be wire tied with two No. 16 Birmingham wire gauge or heavier wire ties.

6. *Test.* The finished container, filled and closed, must be capable of withstanding a drop test of 4 feet on the butt without sifting or rupture of any ply.

Marking

7. *On each container.* By marks at least 1 inch high as follows:

(a) *MIN-W11.* This marking shall be understood to certify that the container complies with all specification requirements.

(b) Name and address of maker located above or below the mark specified in (7)(a).

[Order 74, 6 FR 277, Jan. 11, 1941]

§ 146.09-11 Requirements of equipment for handling explosives.

(a) A chute for loading and unloading explosives must be constructed of smooth planed boards not less than one-inch thick with side guards of the same material at least 4 inches high. Only brass screws may be used to assemble the sides and bottom. D-shaped wooden strips or runners not more than six inches apart and running the length of the chute must be fastened to the upper surface of the slide by glue and wooden dowels extended through the bottom of the chute. Four lashing rings must be provided, one at each outside corner of the chute, for purposes of securing during use.

(b) A roller conveyor constructed of aluminum or other non-sparking material may be used for loading or unloading explosives. The conveyor must be grounded when in use.

(c) A powered conveyor may be used only after the design, construction, and specifications have been approved by the Commandant (G–MTH).

[Amdt. 176-1, 41 FR 28116, July 8, 1976, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 146.09–15 Use of power-operated industrial trucks on board vessels.

(a) A power-operated truck (including a power-operated tractor, forklift, or other specialized truck used for cargo handling) may not be used on board a vessel in a space containing military explosives unless the truck complies with the requirements of this section.

(b) Each truck must have a specific designation of Underwriter's Laboratories or Factory Mutual Laboratories. Any repair or alteration to a truck must be equivalent to that required on the original designation.

(c) *Description of designations.* The recognized testing laboratory type designations are as follows:

(1) An "E" designated unit is an electrically-powered unit that has minimum acceptable safeguards against inherent fire hazards.

(2) An "EE" designated unit is an electrically-powered unit that has, in addition to all the requirements for the "E" unit, the electric motor and all other electrical equipment completely enclosed.

(3) An "EX" designated unit is an electrically-powered unit that differs from the "E" and "EE" units in that the electrical fittings and equipment are so designed, constructed, and assembled that the unit may be used in certain atmospheres containing flammable vapors or dusts.

(4) A "G" designated unit is a gasoline-powered unit having minimum acceptable safeguards against inherent fire hazards.

(5) A "GS" designated unit is a gasoline-powered unit that is provided with additional safeguards to the exhaust, fuel, and electrical systems.

(6) An "LP" designated unit is similar to a "G" unit except that it is powered by liquefied petroleum gas instead of gasoline.

(7) An "LPS" designated unit is a unit similar to a "GS" unit except that liquefied petroleum gas is used for fuel instead of gasoline.

(8) A "D" designated unit is a unit similar to a "G" unit except that it is powered by a diesel engine instead of a gasoline engine.

(9) A "DS" designated unit is a unit powered by a diesel engine provided with additional safeguards to the exhaust, fuel, and electrical systems.

(d) *Explosives.* A truck may not be used in a hold or compartment containing explosives unless its use is approved by the Commandant (G–MTH). In a space in which packaged small arms ammunition without explosive bullets is stowed, an approved power-operated industrial truck (except "E", "G", or "LP") may not be used unless its use is approved by the Captain of the Port when the truck is to be so used.

(e) [Reserved]

(f) *Minimum safety features.* In addition to the construction and design safety features required, each truck must have at least the following minimum safety features:

(1) The truck must be equipped with a warning horn, whistle, gong, or other device that may be heard clearly above normal shipboard noises.

(2) When the truck operation may expose the operator to danger from a falling object, the truck must be equipped with a driver's overhead guard, when the overall height of the truck with forks in the lowered position is limited by head room the overhead guard may be omitted. This overhead guard is only intended to offer protection from impact of small packages, boxes, bagged material, or similar hazards.

(3) A fork lift truck which handles small objects or unstable loads must be equipped with a load backrest extension having height, width, and strength sufficient to prevent any load, or part of it, from falling toward the mast is in a position of maximum backward tilt. It must be constructed in a manner that does not interfere with good visibility.

(4) The forks on a fork lift truck must be secured to the carriage so as to prevent any unintentional lifting of the toe which could create a hazard. The forks may not display permanent

deformation when subjected to a test load of three times the rated capacity.

(5) Each fork extension or other attachment must be secured to prevent unintentional lifting or displacement on primary forks.

(6) Tires extending beyond the confines of the truck shall be provided with a guard to prevent the tires from throwing particles at the operator.

(7) Unless the steering mechanism is a type that prevents road reactions from causing the steering handwheel to spin, a mushroom type steering knob must be used to engage the palm of the operator's hand, or the steering mechanism must be arranged in some other manner to prevent injury. The knob must be mounted within the perimeter of the wheel.

(8) All steering controls must be confined within the clearance of the truck or guarded so that movement of the controls will not result in injury to the operator when passing stanchions, obstructions or other.

(g) *Special operating conditions.* (1) A truck may not be used on board a vessel unless prior notification of its use is given to the master or senior deck officer onboard.

(2) Before a truck is operated on board a vessel, it must be in a safe operating condition as determined by the master or senior deck officer on board.

(3) Any truck that emits sparks or flames from the exhaust system must immediately be removed from service and may not be returned to service until the cause of these sparks or flames has been eliminated.

(4) A truck may not be operated on board a vessel when the temperature of any part of the truck is found to be in excess of a safe operating temperature.

(5) All truck motors must be shut off immediately when an emergency condition arises on board a vessel.

(6) All truck motors must be shut off immediately when a breakage or leakage of packages containing flammable liquids or gases, flammable solids, oxidizers, or organic peroxides occurs or is discovered.

(7) The rated capacity of the truck must be posted on the truck at all times in a conspicuous place. This capacity may not be exceeded.

(8) At least one Coast Guard approved marine type size 1 Type B, or UL approved 5BC portable fire extinguisher, or its approved equivalent, must be affixed to the truck in a readily accessible position or must be kept in close proximity, available for immediate use.

(9) The vessel's fire fighting equipment, both fixed (where installed) and portable, must be kept ready for immediate use in the vicinity of the space being worked.

(h) *Refueling.* (1) A truck using gasoline as fuel may not be refueled in the hold or on the weather deck of a vessel unless a portable non-spilling fuel handling system of not over five gallons capacity is used. Gasoline may not be transferred to a portable non-spilling fuel handling device on board the vessel.

(2) A truck using liquefied petroleum gas as fuel may not be refueled in the hold or on the weather deck of a vessel unless it is fitted with a removable tank and the hand-operated shutoff valve of the depleted tank is closed. In addition, the motor must be run until it stalls from lack of fuel and then the hand-operated shutoff valve closed before the quick disconnect fitting to the fuel tank is disconnected.

(3) A truck using diesel oil as fuel may not be refueled on the weather deck or in the hold of a vessel unless a portable container of not over a five gallon capacity is used. A truck may be refueled or a portable container may be refilled from a larger container of diesel fuel on the weather deck of a vessel if a suitable pump is used for the transfer operation and a drip pan of adequate size is used to prevent any dripping of fuel on the deck.

(4) Refueling must be performed under the direct supervision of an experienced and responsible person specifically designated for this duty by the person in charge of the loading or unloading of the vessel.

(5) Refueling may not be undertaken with less than two persons specifically assigned and present for the complete operation, at least one of whom must be experienced in using the portable fire extinguishers required in the fuel area.

(6) At least one Coast Guard approved marine type size 1 Type B or UL approved 5BC portable fire extinguisher or its approved equivalent, must be provided in the fueling area. This is an addition to the extinguisher required by paragraph (g)(8) of this section.

(7) The location for refueling trucks must be designated by the master or senior deck officer on board the vessel. "NO SMOKING" signs must be conspicuously posted in the area.

(8) The location designated for refueling must be adequately ventilated to insure against accumulation of any hazardous concentration of vapors. When a truck is being refueled, the ventilation requirements of § 146.09-16 apply.

(9) Before any truck in a hold is refueled or before any fuel handling device or unmounted liquefied petroleum gas cylinder is placed in a hold, the motors of all trucks in the same hold must be stopped.

(10) All fuel handling devices and unmounted liquified petroleum gas containers must be removed from a hold before any truck motor is started and the trucks are placed in operation in that hold.

(i) *Replacing batteries.* Batteries for electrically powered trucks and for the ignition systems of internal combustion powered trucks may be changed in the hold of a vessel subject to the following conditions:

(1) Only suitable handling equipment may be employed.

(2) Adequate precautions must be taken to avoid damage to the battery, short circuiting of the battery, and spillage of the electrolyte.

(j) *Charging of batteries.* Batteries of industrial trucks may be recharged in a hold of a vessel subject to the following conditions:

(1) The batteries must be housed in a suitable, ventilated, portable metal container with a suitable outlet at the top for connection of a portable air hose, or must be placed directly beneath a suitable outlet at the top for connection of a portable air hose. The air hose must be permanently connected to an exhaust duct leading to the open deck and terminate in a gooseneck or other suitable weather head. If natural ventilation is not practicable or adequate, mechanical means of exhaust must be employed in conjunction with the duct. The air outlet on the battery container must be equipped with an interlock switch so arranged that the charging of the battery cannot take place unless the air hose is properly connected to the box.

(2) If mechanical ventilation is used, an additional interlock must be provided between the fan and the charging circuit so that the fan must be in operation in order to complete the charging circuit for operation. It is preferable that this interlock switch be of a centrifugal type driven by the fan shaft.

(3) The hold may not contain any hazardous materials.

(4) The charging facilities may be part of the truck equipment or may be separate from the truck and located inside or outside the cargo hold. The power supply or charging circuit (whichever method is used) must be connected to the truck by a portable plug connection of the break-away type. This portable plug must be so engaged with the truck battery charging outlet that any movement of the truck away from the charging station will break the connection between the plug and receptacle without exposing any live parts to contact with a conducting surface or object and without the plug falling to the deck where it may become subject to damage.

(5) All unmounted batteries must be suitably protected or removed from an area in the hold of the vessel before any truck is operated in that area.

(k) *Stowage of power-operated industrial trucks onboard a vessel.* (1) Trucks may be stowed in any location onboard a vessel subject to the following conditions:

(i) Each gasoline-powered truck must have all the fuel expended from the fuel system.

(ii) Each liquefied petroleum gas-operated truck must have the fuel tank removed and all the fuel expended from the fuel system.

(2) Any truck not meeting the conditions set forth in paragraph (k)(1) of this section must be stowed on the open deck except for intervals such as lunch hours, between work shifts, and

interdock and intraport movements. If a truck is stowed in a fixed metal enclosure located on or above the weather deck, this enclosure must have access from the weather deck only and must have adequate ventilation arranged to remove vapors from both the upper and lower portions of the space.

(l) *Packaging and stowage of fuel onboard a vessel*—(1) *Packaging.* Flammable liquids and gases to be used as fuels for trucks must be packaged in DOT specification containers, A.S.M.E. containers, or portable safety containers approved by a recognized testing laboratory and authorized for the contents.

(2) *Marking and labeling.* The appropriate DOT label must be affixed to each container of flammable liquid or flammable gas.

(3) *Stowage.* Each container must be stowed on or above the weather deck as designated by the master. However, a DOT specification container, A.S.M.E. container, or portable safety container having a capacity of five gallons or less and approved by a recognized testing laboratory may be stowed below deck in a paint locker and diesel fuel may be stowed in any location designated by the master.

[Amdt. 176-1, 41 FR 28116, July 8, 1976, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 146.09-16 Spaces exposed to carbon monoxide or other hazardous vapors.

When military explosives are transported by vessel in an enclosed space which is exposed to carbon monoxide or other hazardous vapors from exhausts of power-operated industrial trucks or other mechanized equipment, the space must be provided with adequate ventilation to prevent the accumulation of dangerous vapors. The senior deck officer shall insure that a test of the carbon monoxide content of the atmosphere is made as frequently as conditions require to detect the presence of any dangerous concentration of vapors in areas where persons may be working. The test must be made by a person acquainted with the test equipment and procedure. The carbon monoxide concentration in any hold or intermediate deck where any person is working may not exceed 50 parts per million (0.005 percent) as a time weighted average. Persons may not be permitted to remain in any hold or intermediate deck where the concentration exceeds 75 parts per million (0.0075 percent). Portable blowers of adequate size and location may be used to remove any vapors not removed by installed ventilation systems.

Subpart 146.20—Detailed Regulations Governing Explosives

SOURCE: CGFR 52-8, 17 FR 6464, July 17, 1952, unless otherwise noted.

§ 146.20-1 An explosive.

For the purpose of the regulations in this subchapter an explosive is defined as any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified in the regulations in this part.

§ 146.20-3 Prohibited or not permitted explosives.

The offering of the following explosives for transportation, carriage, conveyance, storage, stowage, or use on board vessels is forbidden:

(a) Fulminates or other detonating compounds in bulk in dry condition.

(b) Explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F.).

(c) Explosives containing an ammonium salt and a chlorate.

(d) Liquid nitroglycerin, diethylene glycol dinitrate, or other liquid explosives not authorized by the Commandant of the Coast Guard.

(e) Explosives condemned by the Department of Transportation (except properly packed samples for laboratory examinations). Appeal may be made to the Department of Transportation from such condemnations.

(f) Leaking or damaged packages of explosives.

(g) Condemned or leaking dynamite shall not be repacked and offered for shipment unless written authority is granted by the Department of Transportation and the repacking is done by a competent person in the presence of an inspector designated by the Department of Transportation.

(h) Firecrackers, flash crackers, salutes, or similar commercial devices which produce or are intended to produce an audible effect, the explosive content of which exceeds 12 grains each in weight, and pest control bombs, the explosive content of which exceeds 18 grains in weight; and any such devices, without respect to explosive content which on functioning are liable to project or disperse metal, glass or brittle plastic fragments.

(i) Fireworks that combine an explosive and a detonator or blasting cap.

(j) Fireworks containing an ammonium salt and a chlorate.

(k) Fireworks containing yellow or white phosphorus.

(l) Fireworks or fireworks compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F.).

(m) Fireworks condemned by the Department of Transportation except properly repacked samples for laboratory examinations.

(n) Toy torpedoes, the maximum outside dimension of which exceeds ⅞ inch, or toy torpedoes containing a mixture of potassium chlorate, black antomony and sulfur with an average weight of explosive composition in each torpedo exceeding 4 grains.

(o) Toy torpedoes containing a cap composed of a mixture of red phosphorus and potassium chlorate exceeding an average of one-half (0.5) grain per cap.

(p) Fireworks containing copper sulfate and a chlorate.

(q) New explosives and explosive devices except samples for laboratory examination and military explosives of a security classification approved by the United States Army Material Command; Commander, Naval Ordnance Systems Command, Department of the Navy; or Commander, Air Force Systems Command and Commander, Air Force Logistics Command, Department of the Air Force. All other new explosives must be approved for transportation by the Department of Transportation.

(r) Loaded firearms.

[CGFR 52-8, 17 FR 6464, July 17, 1952]

EDITORIAL NOTE: For FR citations affecting § 146.20-3 see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 146.20-5 Acceptable explosives.

(a) Acceptable explosives are divided by the Department of Transportation regulations into three classes according to degree of hazard in transportation, as follows:

Class A explosives, detonating or otherwise of maximum hazard.

Class B explosives, inflammable hazard.

Class C explosives, minimum hazard.

(b) Acceptable explosives are defined by the Department of Transportation regulations as set forth in this subpart, and such definitions are binding upon all shippers making shipments of any explosives by common carrier vessels engaged in interstate or foreign commerce by water. Such definitions are accepted and adopted and form part of the regulations in this subchapter applying to all shippers making shipments of explosives by any vessel and shall apply to the owners, charterers, agents, masters or persons in charge of vessels and to other persons transporting, carrying, conveying, storing, stowing or using explosives on board any vessel.

§ 146.20-7 Class A explosives.

Class A explosives are defined as:

(a) *Type 1.* Solid explosives which can be caused to deflagrate by contact with sparks or flame such as produced by safety fuse or an electric squib, but cannot be detonated[1] by means of a

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[1] The detonation test is performed by placing the sample in an open-end fiber tube which is set on the end of a lead block approximately 1⅛ inches in diameter and 4 inches high which, in turn, is placed on a solid base. A steel plate may be placed between the fiber tube an the lead block.

No. 8 test blasting cap.[2] Examples: Black powder and low explosives.

(b) *Type 2.* Solid explosives which contain a liquid explosive ingredient, and which, when unconfined,[3] can be detonated by means of a No. 8 test blasting cap;[2] or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus,[4] under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Examples: Commercial dynamite containing a liquid explosive ingredient.

(c) *Type 3.* Solid explosives which contain no liquid explosive ingredient and which can be detonated, when unconfined,[3] by means of a No. 8 test blasting cap;[2] or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus[4] under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Examples: Commercial dynamite containing no liquid explosive ingredient, trinitrotoluene, amatol, tetryl, picric acid, urea nitrate, pentolite and commercial boosters.

(d) *Type 4.* Solid explosives which can be caused to detonate, when unconfined,[3] by contact with sparks or flame such as produced by safety fuse or an electric squib; or which can be exploded in the Bureau of Explosives' Impact Apparatus[4] in more than 50 percent of the trials under a drop of less than 4 inches. Examples: Initiating and priming explosives, lead azide, fulminate of mercury, etc.

(e) *Type 5.* Desensitized liquid explosives are explosives which may be detonated separately, or when absorbed in sterile absorbent cotton, by a No. 8 test blasting cap;[2] but which cannot be exploded in the Bureau of Explosives' Impact Apparatus[4] by a drop of less than 10 inches. The desensitizer must not be significantly more volatile than nitroglycerin and the desensitized explosive must not freeze at temperatures above minus 10° F. Example: Desensitized nitroglycerin.

(f) *Type 6.* Liquid explosives that can be exploded in the Bureau of Explosives' Impact Apparatus[4] under a drop of less than 10 inches. Example: Nitroglycerin. See "Prohibited or not permitted explosives" in § 146.20-3.

(g) *Type 7.* (1) Blasting caps[5] are small tubes, usually made of an alloy of either copper or aluminim, or of molded plastic, closed at one end and loaded with a charge of initiating or priming explosives, Class A—Type 4, either with or without other suitable explosives. The total weight of explosives per unit shall not exceed 150 grains. Blasting caps[5] which have been provided with a means for firing by an electric current, and sealed, are known as electric blasting caps.

(2) Detonating primers are devices for commercial use which contain a detonator and an additional charge of explosives, all assembled in a suitable envelope.

(3) Detonating fuzes, class A explosives, are used in the military service to detonate the high explosive bursting charges of projectiles, mines, bombs, torpedoes, and grenades. In addition to a powerful detonator, they may contain several ounces of a high explosive, such as tetryl or dry nitrocellulose, all assembled in a heavy steel envelope. They may also contain a small amount of radioactive component. Those that are so made and packed that they will not cause functioning of other fuzes, explosives, or

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[2] A No. 8 test blasting cap is one containing 2 grams of a mixture of 80 percent mercury fulminate and 20 percent potassium chlorate, or a cap of equivalent strength.

[3] "Unconfined" as used in this section does not exclude the use of paper or soft fiber tube wrapping to facilitate tests.

[2, 3] See footnote 2, 3 on previous page.

[4] The Bureau of Explosives' impact apparatus is a testing device designed so that a guided 8-pound weight may be dropped from predetermined heights so as to impact specific quantities of liquid or solid materials under fixed conditions. Detailed prints may be obtained from the Bureau of Explosives, 63 Vesey Street, New York 7, N.Y.

[5] Blasting caps, blasting caps with safety fuse, or electric blasting caps in quantities of 1,000 or less are classified as Class C explosives.

explosive devices in the same or adjacent containers are classed as class C explosives.

(h) *Type 8.* (1) Any solid or liquid compound, mixture or device which is not specifically included in any of the above types, and which under special conditions may be so designated and approved by the Bureau of Explosives. Example: Shaped charge, commercial.

(2) A shaped charge, commercial, consists of a plastic, paper, or other suitable container comprising a charge of not to exceed 8 ounces of a high explosive containing no liquid explosive ingredient and with a hollowed-out portion (cavity) lined with a rigid material. Detonators or other initiating elements shall not be assembled in the device.

(i) *Charged oil well jet perforating guns.* Charged oil well jet perforating guns are steel tubes, metallic strips, or tubular frameworks into which are inserted shaped charges connected in series by primacord. These devices are not permitted to be shipped as cargo on board any vessel subject to the regulations in this subchapter. Charged oil well jet perforating guns when carried in special motor vehicles under the conditions prescribed in 49 CFR 173.80 or on offshore downhole tool pallets, and accompanied by personnel trained in the safe handling of these devices are classed as Class C explosives: *Provided,* That:

(1) No blasting caps, electric blasting caps or other firing devices shall be affixed or installed in the guns.

(2) Each shaped charge shall contain not over 4 ounces of explosives.

(3) Each shaped charge if not completely enclosed in glass or metal shall be fully protected by a metal cover after installation in the gun.

(4) The total weight of the explosive contents of shaped charges assembled in guns being carried does not exceed 20 pounds per vehicle, pallet or vessel.

(j) *Type 9.* Propellant explosives, Class A, are solid chemicals or solid mixtures which are designed to function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Propellant explosives, Class A, include some types of smokeless powder and some types of solid propellant explosives for jet thrust units, rockets, or other devices. Any propellant explosive in Class A which detonates in any one out of five trials when tested in the packages in which it is offered for transportation. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and the absence of flame shall be considered as evidence of detonation.

[CGFR 52-8, 17 FR 6464, July 17, 1952]

EDITORIAL NOTE: For FR citations affecting § 146.20-7 see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 146.20-9 Class B explosives.

(a) Class B explosives are defined as those explosives which in general function by rapid combustion rather than detonation and include some explosive devices, such as special fireworks, flash powders, some pyrotechnic signal devices and liquid or solid propellant explosives which include some smokeless powders.

(b) Propellant explosives, Class B, are solid or liquid chemicals or chemical mixtures which function by combustion. The combustion is controlled by composition, size, form of grain, or other chemical or mechanical means. Any propellant is Class B which fails to detonate in five trials when tested in the package in which it is offered for shipment. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container, placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidence of detonation. Propellant explosives, Class B, include smokeless powder for small arms (see note 1), smokeless powder for cannon, liquid monopropellant fuel, smokeless powder, or solid propellant explosives for rockets, jet thrust units, or other devices. Black powder is not included in this classification and is defined in § 146.20-7(a). Fire extinguisher charges containing not to exceed 50 grains of propellant explosives per unit are exempt from the regulations in this part.

Note 1: Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one vehicle, container or other packaging authorized by 49 CFR 173.89(g) (except shipments by, for, or to the Departments of the Army, Navy, or Air Force of the U.S. Government) shall be classed as a flammable solid for purposes of transportation when packaged in accordance with 49 CFR 173.89(g). To be classed as a flammable solid, smokeless powder for small arms shall be limited to not more than 100 pounds in one hold or vehicular deck irrespective of the number of vehicles or containers.

[CGFR 65-52, 30 FR 15216, Dec. 9, 1965, as amended by CGFR 69-127, 35 FR 9981, June 17, 1970; 41 FR 28120, July 8, 1976]

§ 146.20–11 Class C explosives.

Class C explosives are defined as certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities, and certain types of fireworks.

[CGFR 65-52, 30 FR 15216, Dec. 9, 1965]

§ 146.20–13 New explosives, definitions; approval and notification.

(a) As used in this section, "new explosive" means an explosive compound, mixture or device, produced by a person who:

(1) Has not previously produced that explosive compound, mixture or device; or

(2) Has previously produced the explosive compound, mixture or device, but has made a change in the formulation, design, process or production equipment. An explosive compound, mixture or device will not be considered a "new explosive" if an agency listed in paragraph (b) of this section has determined and confirmed in writing to the Office of Hazardous Materials Operations (OHMO), Department of Transportation, that there are no significant differences in hazard characteristics relative to the explosive compound, mixture or device previously approved.

(b) No person may offer a new explosive for transportation unless it has been examined, classed, and approved by one of the following agencies:

(1) Bureau of Explosives;

(2) The U.S. Energy Research and Development Administration (ERDA) for new explosives made by, or under the direction or supervision of ERDA, when tested in accordance with the Explosives Hazard Classification Procedures contained in DOD TB 700-2 (May 19, 1967), or

(3) U.S. Army Material Development and Readiness Command (DRCFS), Naval Sea Systems Command (NAVSEA 04H), or HQUSAF (IGD/SEV) for new explosives made by, or under the direction or supervision of the Department of Defense when tested in accordance with the Explosives Hazard Classification Procedures contained in DOD TB 700-2 (May 19, 1967), (NAVORDIMST 8020.3 to 11A-1-47, DSAR 8220.1).

(c) Except as provided in paragraphs (d) and (e) of this section, each person who offers a new explosive for transportation, other than a new DOD explosive covered by a security classification, must file a copy of the approval for the new explosive accompanied by a supporting laboratory report of equivalent data with OHMO before offering the new explosive for transportation.

(d) Notwithstanding paragraph (b) of this section, any person may offer a sample of a new explosive that has not been approved for transportation by railroad, highway, or vessel to a laboratory for examination and approval if:

(1) The new explosive has been assigned a tentative shipping description and class in writing by one of the agencies listed in paragraph (b) of this section;

(2) The sample consists of no more than five pounds of the new explosive;

(3) The new explosive is packaged as required in this part according to the tentative description and class assigned unless otherwise specified in writing by one of the agencies listed in paragraph (b) of this section, and

(4) The package is labeled as required by this subchapter and the following is marked on the package:

(i) The words "SAMPLE FOR LABORATORY EXAMINATION";

(ii) The net weight of the new explosive, and

(iii) The tentative shipping description.

(e) Notwithstanding paragraph (b) of this section, a manufacturer of a new explosive that has not been examined or approved may transport that new explosive from where it was produced to an explosive testing facility if:

(1) The new explosive is not a forbidden explosive or an initiating explosive according to this part;

(2) If the new explosive is a compound or mixture, it must be described as high explosive or high explosive, liquid, as appropriate (other than when contained in a device) and packed, marked, labeled, and described on the shipping paper as required by this part;

(3) If the new explosive is a device, it must be assigned a tentative description and class by the owner and packed, marked, labeled, and described on the shipping paper as required by this part based on its tentative description and class.

(4) The new explosive is transported in a motor vehicle operated by the owner of the explosive, and

(5) The new explosive is accompanied by a person, in addition to the driver of the motor vehicle, who is qualified by training and experience to handle the explosive.

§ 146.20-53 Magazine vessels.

(a) *General.* The requirements of this section are applicable to magazine vessels and are in addition to any prescribed elsewhere in this part.

(b) *Type vessel authorized.* A single deck vessel with or without a house on deck is the only type vessel that may be used as a magazine vessel. A magazine vessel may not be moved while explosives are on board.

(c) *Location of explosives.* Class A and Class B explosives in excess of 5,000 pounds stored in any magazine vessel must be stowed below deck. No explosive may be stowed on deck unless the vessel is fitted with a deck house having a stowage area which meets the requirements in this subpart for the stowage of explosives. Quantities of blasting caps in excess of 1,000 may not be stored on the same magazine vessel with Class A or Class B explosives.

(d) *Explosives storage spaces.* Any compartment on a magazine vessel used for the stowage of explosives must be completely ceiled with wood so as to provide a smooth interior surface. Each metal stanchion in the compartment must be boxed in the same manner. An overhead ceiling is not required when the overdeck is weathertight. All nail and bolt heads must be countersunk and any exposed metal must be covered with wood.

(e) *Primers and blasting caps.* No initiating or priming explosive may be stowed in the same compartment with any other explosive when there is any high explosive on the same magazine vessel. Blasting caps must be stowed at least 25 feet from any bulkhead forming a boundary of a compartment containing any other explosives.

(f) *Dry storage spaces.* A magazine vessel having a dry storage space capable of being used for any purpose whatsoever must have a cofferdam at least 24 inches wide fitted between the dry storage space and each adjacent compartment containing explosives. The cofferdam must be constructed of wood or steel, formed by two tight athwartship bulkheads extending from the skin of the vessel to the overdeck. If the cofferdam extends to the weather deck, a watertight hatch must be fitted in the deck to provide access to the cofferdam.

(g) *Lighting.* Non-sparking, battery-powered, self-contained electric lanterns or non-sparking hand flashlights are the only means of artificial light authorized.

(h) *Living quarters.* Living quarters must be fitted on the inside with asbestos board or other equivalent fire resistant material. Bracketed ship's lamps are the only lighting fixtures authorized to be used in the living quarters. Any stove used for heating or cooking must be securely fastened and may not be mounted closer than 6 inches to the deck or sides of the house. Any smoke pipe for the stove which passes through the roof of the house must be kept at least 3 inches away from any woodwork. Each smoke pipe must be protected by a layer of asbestos, an air space of a least 1 inch, and a metal collar of at least 16 gauge sheets secured only on the weather side of the roof. There may be no opening from any living quarters into any stowage compartment.

(i) *Storage of other hazardous materials.* Magazine vessels having explosives on board may not be used for the storage of any other hazardous material.

(j) *Magazine vessel's stores.* Articles for use as stores on board any magazine vessel must be in compliance with the requirements of 46 CFR part 147.

(k) *Matches.* Safety matches requiring a prepared surface for ignition are the only type of matches authorized for use on board a magazine vessel. They must be kept in a metal box or can with a metal cover and stored in the custodian's living quarters.

(l) *Firearms.* Firearms and ammunition (other than cargo) are not permitted on board a magazine vessel.

(m) *Fire extinguishing equipment.* No explosive may be received, stored, or dispensed from any magazine vessel, unless four 2½-gallon extinguishers of the soda-acid type and four 2-gallon pails filled with dry sand are placed about the vessel. The contents of each liquid extinguisher continuously exposed to a temperature lower than 40 degrees F. (4.5 degrees C.) must be modified or otherwise protected to prevent freezing.

(n) *Supervision.* A magazine vessel containing explosives must be continuously attended by a custodian employed for that purpose by the vessel's owner.

(o) *Unauthorized persons on magazine vessels.* The custodian of a magazine vessel shall prevent unauthorized persons from coming on board unless it is necessary to abate a hazard to human life or a substantial hazard to property.

(p) *Repacking of explosives on board.* No explosive may be repacked on board a magazine vessel. Any broken or damaged package must be placed in an open box and carried to a safe location for repacking or other disposition.

(q) *Work boat.* Each magazine vessel must be equipped with a work boat.

(r) *Life preservers.* One approved personal flotation device must be available for each person employed on a magazine vessel.

(s) *Fenders.* Each magazine vessel must be fitted with fenders in sufficient number and size to prevent any vessel tieing up alongside from coming in contact with the hull.

Subpart 146.29—Detailed Regulations Governing the Transportation of Military Explosives and Hazardous Munitions on Board Vessels

SOURCE: CGFR 62-11, 27 FR 5287, June 5, 1962, unless otherwise noted.

§ 146.29-1 Effective date.

The regulations in this subpart will become effective on and after July 1, 1962.

§ 146.29-3 Relationship to other regulations.

(a) Commercial shipments of explosives shall be conducted in accordance with 49 CFR parts 171-189.

(b) Where reference is made to other hazardous materials in this subpart, the regulations in 49 CFR parts 171-189 apply.

[Amdt. 176-1, 41 FR 28122, July 8, 1976]

§ 146.29-7 Port security regulations.

The applicable provisions of 33 CFR parts 6, and 121 to 126, inclusive, shall, unless specifically authorized to the contrary by any provision of this subpart, be complied with by vessels, masters, agents, or charterers thereof and by all persons engaged in handling, loading, stowing or unloading explosives.

§ 146.29-9 Import shipments.

Import shipments of military explosives shall be made in accordance with the provisions of the regulations in this subpart.

§ 146.29-11 Definitions and abbreviations.

For the purpose of the regulations in this subpart, certain words, phrases, and abbreviations are defined as follows:

(a) *Military explosives.* Military explosives for the purpose of this subpart consist of all Department of Transportation's Classes A, B, and C explosives as defined below shipped by, for, or to the Departments of the Army, Navy, or Air Force of the United States or similar types of explosives shipped by, for, or to the government of any country whose defense is deemed vital to the defense of the United States. However, this definition shall not include those explosives shipped by, for, or to the Corps of Engineers, Department of the Army, for use in river and harbor works or other works under permits issued by that Agency, in which case the regulations in this part pertaining to commercial explosives shall apply. Military explosives are divided into two classes, as follows:

(1) *Ammunition.* Ammunition consists of all types of projectiles, cartridges, grenades, bombs, mines, torpedoes, torpedo warheads, propellant powder charges, pyrotechnics, rockets, missiles, special weapons, chemical, smoke or incendiary ammunition, or other "made up" explosive devices that are utilized by the armed forces in the prosecution of a war.

(2) *Explosives in bulk.* Explosives in bulk consist of any high explosives, black powder, and low explosives or propellant explosives in accordance with the definitions in §§ 146.20-1, 146.20-7, and 146.20-9, when such substances are shipped in containers other than containers such as bombs, grenades, mines, torpedoes, powder bags in individual containers, cartridges, projectiles, fuzes, detonators, caps, primers, and similar "made up" ammunition devices.

(b) *Hazardous munitions.* Hazardous munitions for the purpose of these regulations are those dangerous articles used as oxidizers or fuels for missile propulsive systems. Such fuels and oxidizers are listed in Tables XI-C and XI-D and will be stowed and handled in accordance with these tables when shipped with military explosives. When shipment is made on a vessel not carrying military explosives, the hazardous munitions may be shipped under the regulations contained in 49 CFR parts 171-189.

(c) *Related terms*—(1) *Adjacent hold; hold adjacent.* Any hold which has as one of its boundaries a permanent steel bulkhead that is common, either partially or in its entirety, to another hold shall be termed "adjacent hold" or "hold adjacent" to the focal hold. This shall not be construed as meaning a hold above or a hold below said hold nor shall it include a hold that is situated diagonally from said hold and has only a corner as a common boundary.

(2) *Any hold above.* "Any hold above" shall mean any hold that is partially or entirely in the same vertical plane over another hold even though there may be a hold or holds intervening.

(3) *Any hold below.* "Any hold below" shall mean any hold that is partially or entirely in the same vertical plane under another hold even though there may be a hold or holds intervening.

(4) *Ammunition for cannon.* Ammunition for cannon is fixed, semi-fixed or separate loading ammunition which is fired from a cannon, mortar, gun, howitzer or recoilless rifle.

(5) *Ammunition for cannon with empty projectiles, inert-loaded projectiles, solid projectiles or without projectiles, and catapult charges exceeding 2 inches in diameter.* Ammunition for cannon with empty projectiles, inert-loaded projectiles, solid projectiles or without projectiles, and catapult charges exceeding 2 inches in diameter, is fixed ammunition assembled in a unit consisting of the cartridge case containing the propelling charge and primer with empty, inert-loaded, or solid projectiles, or without projectiles, which is fired from a cannon, mortar, gun, howitzer, or recoilless rifle.

(6) *Ammunition for cannon with projectiles.* Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles or illuminating projectiles is fixed ammunition assembled in a unit consisting of the cartridge case

containing the propelling charge and primer, and the projectiles, fuzed or unfuzed.

(7) *Ammunition for small arms with explosive bullets or explosive projectiles.* Ammunition for small arms with explosive bullets or ammunition for small arms with explosive projectiles is fixed ammunition to be used in machine guns or similar fire arms and consists of a metallic cartridge case, the primer and the propelling charge, with explosive bullet or explosive projectile with or without detonating fuze, the component parts necessary for one firing being all in one assembly.

(8) *Boosters, bursters and supplementary charges.* Boosters and supplementary charges consist of a casing containing a high explosive and are used to increase the intensity of explosion of the detonator of a detonating fuze. Bursters consist of a casing containing a high explosive and are used to rupture a projectile or bomb to permit release of its contents.

(9) *Cargo hold.* A cargo hold is a space allotted entirely to the carriage of cargo and is bounded by permanent steel bulkheads, decks and the shell of the vessel; the deck openings being provided with means of effectively closing the hold against the weather, and in the case of superimposed holds, effectively closing off each hold.

(10) *Cargo net.* A cargo net is a net made of fiber or wire rope and used as a means of handling loose or package cargo to and from the hold of a vessel.

(11) *Cargo transporter.* This term covers a noncollapsible, reusable steel shipping box of not over 135 cubic feet capacity, used for shipping separate items of cargo as a unit, and handled on board ship by "life-on/lift-off" methods. Such container must conform to Military Specification MIL-B-11886 or MIL-B-21560. It is commonly referred to as "Conex Box."

(12) *Chemical ammunition.* Chemical ammunition used in warfare is all kinds of explosive chemical projectiles, bombs, grenades, mines, etc., loaded with toxic, tear, or other gas, smoke or incendiary agent, also such miscellaneous apparatus as cloud-gas cylinders, smoke generators, etc., that may be utilized to project chemicals.

(13) *Compartment.* A compartment is any space formed by permanent steel bulkheads and the ship's side and decks. The limits of a compartment are determined by the integrity of the bulkheads, shell or decks forming its boundaries. Access openings fitted with doors, hatch covers (steel or wood) or bolted plates are accepted as preserving the integrity of deck, bulkhead or shell.

(14) *Compatible explosives.* Compatible explosives as used in § 146.29-100 shall mean explosives that have compatibility in accordance with the admixture charts in § 146.29-99.

(15) *Complete round.* A complete round of "cannon ammunition," "artillery ammunition" or "gun ammunition" includes ammunition used in cannon or gun of caliber .75 in. and above. It includes complete round with components. The complete round comprises all of the components necessary to fire the cannon or gun once. These components are, in general, the projectile, fuze, propelling charge and primer. Depending upon both the type of propelling charge and method of loading the required components into the weapon, complete rounds of "cannon ammunition," "artillery ammunition" or "gun ammunition" are described as fixed, semifixed, separated or separate loading ammunition.

(16) *Container.* A container is a cargo carrying body other than a portable tank which may be designed and constructed to be removed from a chassis or wheels for water transportation. Military explosives, permitted to be transported in containers are limited to explosives of Coast Guard Classes I and II, with the exception of Class II-J, which are compatible in accordance with the admixture charts in § 146.29-99. All other types of military explosives, including Class II-J may be carried in containers on approval of the Commandant.

(17) *Definition of other hazardous materials.* The definitions of other hazardous materials are in 49 CFR parts 171-189.

(18) *Detonating fuzes.* (i) Detonating fuzes, Class A are used in the military service to detonate the high explosive bursting charges of projectiles, mines, bombs, torpedoes, and grenades. In ad-

dition to a powerful detonator, they may contain several ounces of a high explosive, such a tetryl or dry nitrocellulose, all assembled in a heavy steel envelope. They may also contain a small amount of radioactive component.

(ii) Detonating fuzes, Class C are those that are so made and packed that they will not cause functioning of other fuzes, explosives, or explosive devices in the same or adjacent containers.

(19) *Division bulkhead.* (i) When part of a compartment or hold is utilized for the stowage of military explosives, the remaining portion of such compartment or hold may be utilized for the stowage of general cargo provided a temporary wooden bulkhead is constructed in the compartment or hold to completely divide and protect the stowage of military explosives from the general cargo. The scantlings and construction of such bulkheads shall be as follows: For tween-deck compartments or holds construction shall be of commercial 2-inch boarding, secured on 4″ x 6″ uprights spaced not to exceed 30 inches center to center. For lower holds construction shall be of commercial 2-inch boarding secured on 6″ x 6″ uprights, spaced not more than 24 inches center to center. Random widths of boarding may be used. The boarding shall be close fitted edge to edge and butt to butt to form a smooth surface facing the explosive stowage. Nails shall not protrude beyond the surface of the boarding.

(ii) See § 146.29-81(e) for construction of a partition bulkhead within a Class "A" magazine measuring more than 40 feet in any direction.

(iii) When general cargo is to be stowed adjacent to the exterior of the Class "A" magazine see § 146.29-61(b).

(20) *Dunnage.* Lumber of not less than 1-inch commercial thickness laid over tank tops, decks or against bulkheads, frames, plating, ladders, etc., or used for filling up voids, or fitted around the cargo for the purpose of preventing damage during transportation.

(21) *Explosive bombs.* Explosive bombs are metal or other containers filled with explosives. They are used in warfare and include aeroplane bombs and depth bombs.

(22) *Explosive mines.* Explosive mines are metal or other containers filled with a high explosive.

(23) *Explosive projectiles.* Explosive projectiles are projectiles, guided missiles with warheads, warheads, or rocket heads, loaded with explosives or bursting charges, with or without other materials, for use in cannons, guns, tubes, mortars, or other firing or launching devices.

(24) *Explosive torpedoes.* Explosive torpedoes, such as are used in warfare, are metal devices containing a means of propulsion and a quantity of high explosives.

(25) *Fixed ammunition.* Fixed ammunition describes "cannon ammunition," "artillery ammunition" or "gun ammunition" of the type comprising a cartridge case with primer, a propellant charge and a projectile (fuzed or unfuzed) all of these components being assembled as a unit for one firing.

(26) *Grenades.* Grenades, hand or rifle, are small metal or other containers designed to be thrown by hand or projected from a rifle. They are filled with an explosive or a liquid, gas or solid material such as a toxic or tear gas or an incendiary or smoke producing material and a bursting charge.

(27) *Guided missile ammunition.* Includes missile or rocket bodies and related components; warheads (explosives, chemical practice, etc.); propellants (liquid or solid); fuzes and arming devices with associated components; fins, stabilizers, or control surfaces; either or all of which may be in complete round configuration or as separately packaged items, as issued to assemble complete rounds as fired.

(28) *Hatch.* An opening in the weather deck and all decks below in the same vertical plane through which cargo, etc., is passed. This term is also used in the regulations in this subpart to designate the entire series of holds served through one weather deck hatch.

(29) *Igniters.* Igniters consist of fiberboard, plastic, paper or metal tubes containing a small quantity of igniting compound which is ignited by the

action of a primer, pull wire or scratch composition.

(30) *Jet thrust units (jato), explosive (Class A), or igniters jet thrust (jato), explosive (Class A).* Jet thrust units (jato), explosive (Class A), are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Under certain conditions the chemical fuel with which the unit is loaded may explode. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist airplanes to take off. Igniters jet thrust (jato), explosive (Class A) and igniters, rocket motor, Class A explosives, are devices consisting of an electrically operated or remotely controlled ignition element and a charge of fast burning composition meeting the definition prescribed for Type I Class A explosives assembled in a unit for use in igniting the propelling charge of jet thrust units or rocket motors. Under certain conditions the burning composition may explode.

(31) *Jet thrust units (jato), Class B explosives.* Jet thrust units (jato), Class B explosives are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist airplanes to take off.

(i) Igniters, jet thrust (jato), Class B explosives, and igniters, rocket motor, Class B explosives are devices consisting of an electrically operated or remotely controlled ignition element and a fast-burning composition which functions by rapid burning rather than detonation, assembled in a unit for use in igniting the propelling charge of jet thrust units, rocket motors, or rocket engines.

(ii) Starter cartridges, jet engine, Class B explosives, consist of plastic and/or rubber cases, each containing a pressed cylindrical block of propellant explosive and having in the top of the case a small compartment that encloses an electric squib, small amounts of black powder and smokeless powder, which constitute an igniter. The starter cartridge is used to activate a mechanical starter for jet engines.

(32) *On deck.* "On deck" means that that article may be stowed on the open weather deck of the vessel.

(33) *Overstow.* The term "overstow" as used in these regulations shall mean to stow directly over.

(34) *Pallet.* A pallet is a tray so designed as to be picked up by a fork truck or similar cargo handling equipment. Pallets are not usually equipped with sideboards.

(35) *Palletized unit.* Individual packages or unpackaged items stowed in a compact mass upon a pallet or skids and banded together and to the pallet or skids by metal straps to form a unit consisting of pallet and packages.

(36) *Partition bulkhead.* A partition bulkhead is a temporary bulkhead constructed of commercial 1-inch lumber of widths not less than 4 inches, secured alternately on both sides of the uprights and spaced not more than 6 inches apart. The uprights are at least 2" x 4" size, spaced not more than 30 inches apart.

(37) *Percussion fuzes, combination fuzes, and time fuzes.* Percussion fuzes, combination fuzes, and time fuzes are devices designed to ignite powder charges of ammunition or to initiate an intermediate charge (booster) in projectiles, bombs, etc. When such fuzes are assembled with booster charges they are properly described as "detonating fuzes."

(38) *Pieplate.* A pieplate is the term generally applied to a round, oval or hexagonal tray without sideboards.

(39) *Primers.* Primers are devices used to ignite the powder charges of ammunition. For small-arms ammunition, the primers are "small-arms primers" or "percussion caps."

(40) *Propellant explosives, solid, Class A.* Propellant explosives, Class A, are solid chemicals or solid chemical mixtures which are designed to function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Propellant explosives, Class A, include some types of smokeless powder for small arms and some types of solid propellant explosives for jet thrust units, rockets, or other devices. Any propellant explosive is Class A which detonates in any one out of five

trials when tested in the package in which it is offered for transportation. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electrical squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidence of detonation.

(41) *Propellant explosives, solid Class B.* Propellant explosives, Class B, are solid chemicals or solid chemical mixtures which function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Any propellant explosive is Class B which fails to detonate in five trials when tested in the packages in which it is offered for shipment. (See (40) for test.) Propellant explosives, Class B, include smokeless powder for cannon, smokeless powder or solid propellant explosives for rockets, jet thrust units, or other devices. Black powder is not included in this classification.

(42) *Rocket ammunition.* Rocket ammunition is fixed ammunition which is fired from a tube, launcher, rails, trough, or other device as distinguished from cannon ammunition which is fired from a cannon, gun, or mortar.

(43) *Rocket motor, Class A explosives.* Rocket motor, Class A explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s) closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. (The rocket motor carries its own solid oxidizer-fuel combination.) The propelling charge consists of a mixture of chemicals and/or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will sustain a detonation. Rocket motors, Class A explosives, should be nonpropulsive in shipment (see paragraph (c)(i) of this section). Rocket motors, Class A explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and/or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust neutralizers, or other similar devices must be proven adequate by test prior to authorization for use.

(44) *Rocket motor, Class B explosives.* Rocket motor, Class B explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s), closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. The propelling charge consists of a mixture of chemicals and/or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will not sustain a detonation. (The rocket motor carries its own solid oxidizer-fuel combination.) Rocket motors, Class B explosives, should be nonpropulsive in shipment (see paragraph (c)(i) of this section). Rocket motors, Class B explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and/or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust neutralizers or other similar devices must be proven by test prior to authorization for use.

(45) *Rocket engine (liquid), Class B explosives.* Rocket engine (liquid,) Class B explosives is a complete, self-contained rocket propulsion unit which contains an oxidizer and a fuel, each separated by an aluminum or stainless steel wall of not less than 0.250 inch thickness. Double walls are permitted. Pressurization of the propellant tanks is by use of a gas generator. The ignition source must be in an unarmed position for shipment. Rocket engines (liquid) are used to

propel or provide thrust for rockets, missiles or spacecraft.

(46) *Semifixed ammunition (Army)*. Complete rounds composed of a projectile (fuzed) and a cartridge case with a primer and propellant charge which is in a cloth bag or bags of small size. The base of the projectile fits free in the neck of the cartridge case and may be readily detached from the cartridge case. The round is loaded into the cannon with the projectile assembled to the cartridge case and is handled similarly to fixed ammunition in loading. It may be packed with the projectile disassembled from the cartridge case containing the propellant. The projectile is usually assembled loosely in the cartridge case and is packed in the same individual container.

(47) *Semifixed ammunition (Navy)*. Semifixed ammunition is ammunition in which the primer and the propellant charge are firmly secured in the cartridge case with the projectile separate from the cartridge case. The propellant charge is loaded loosely in the cartridge case, differing in this respect from that of the Army which is loaded in a bag. The end of the cartridge case is sealed with a prepared plug or disc which is fired with the powder and is usually shipped stowed in a metal tank. The projectile is shipped separate. The U.S. Army may refer to this ammunition as separate loading ammunition.

(48) *Separate loading ammunition*. Complete rounds in which the separate components—projectile, propellant charge and primer—are loaded into the cannon or gun separately are known as "separate loading ammunition." Although the propellant charge may be in one section, it is usually divided into parts with each part assembled in a bag packed in outside shipping containers which may be of wood, fiber, or metal.

(49) *Separated ammunition*. In this type of ammunition, the propellant is sealed in a metal cartridge case into which a primer is fitted and this assembly is called a propelling charge. It is separate from the projectile with which it is used but the projectile and the propelling charge are loaded into the weapon in one operation. Separated ammunition is generally used in medium caliber antiaircraft and antitank guns.

(50) *Shelter deck space*. A shelter deck space is a space available for cargo situated above the uppermost complete continuous deck (main deck) and the deck next above. Normally this space contains no permanent watertight transverse bulkheads except at its forward and aft extremities.

(51) *Shoring*. Shoring is a method of securing cargo against movement sidewise or downward. In this subpart it describes the use of timbers fitted vertically or at an angle to the side of the stowage. It may also describe the use of timber to support a stowage from moving downward.

(52) *Skipboard*. A skipboard is the term generally applied to a rectangular or square tray without sideboards.

(53) *Small arms ammunition*. Small arms ammunition is fixed ammunition consisting of a metallic, plastic composition, or paper cartridge case, a primer and a propelling charge, with or without bullet, projectile, shot, tear gas material, tracer components, or incendiary compositions, or mixtures, and is further limited to the following:

(i) Ammunition designed to be fired from a pistol, revolver, rifle, or shotgun held by the hand or to the shoulder.

(ii) Ammunition of caliber less than 20 millimeters with incendiary, solid, inert or empty projectiles (with or without tracers), designed to be fired from machine guns or cannons.

(iii) Blank cartridges including canopy remover cartridges, starter cartridges, and seat ejector cartridges, containing not more than 500 grains of propellant powder, provided that such cartridges shall be incapable of functioning en masse as a result of the functioning of any single cartridge in the container or as a result of exposure to external flame.

(iv) Twenty millimeter ammunition without explosive projectiles or incendiary projectiles.

(54) *Special fireworks*. Special fireworks are manufactured articles designed primarily for the purpose of producing visible or audible pyrotechnic effects by combustion or explosion. Examples are toy torpedoes, railway

torpedoes, some firecrackers and salutes, exhibition display pieces, aeroplane flares, illuminating projectiles, incendiary projectiles or incendiary bombs and smoke projectiles or smoke bombs fuzed or unfused and containing expelling charges but without bursting charges, hand or rifle grenades with ignition elements but not containing bursting charges, flash powders in inner units not exceeding 2 ounces each, flash sheets in interior packages, flash powder or spreader cartridges containing not over 72 grains of flash powder each and flash cartridges consisting of a paper cartridge shell, small-arms primer, and flash composition, not exceeding 180 grains all assembled in one piece. Fireworks must be in a finished state, exclusive of mere ornamentation, as supplied to the retail trade and must be so constructed and packed that loose pyrotechnic composition will not be present in packages in transportation.

(55) *Superstructure.* Superstructure is a structure of a vessel located on the weather deck integral with the deck and of substantial weight and size to provide physical separation of cargoes, e.g., deck house, mast house, bridge structure, etc.

(56) *The hold above.* "The hold above" shall be a hold immediately above another hold having its deck, either partially or in its entirety, common to the overhead of the hold below.

(57) *The hold below.* "The hold below" shall be a hold immediately below another hold having its overhead, either partially or in its entirety, common to the deck of the hold above.

(58) *Tomming.* Tomming is a method of securing cargo against displacement of movement upwardly.

(59) *Tray.* A tray is any flat group of boards securely fastened to bearers in order to provide a level surface for the loading of cargo. Trays are given various names, those applied in some ports differing from those in other ports, according to (i) shape, (ii) method of securing to cargo handling gear, or (iii) use or lack of sideboards in conjunction with the tray.

(60) *Tracer fuzes and tracers.* Tracer fuzes and tracers are devices which are attached to projectiles and contain a slow-burning composition to show the flight of projectiles at night.

(61) *Tween deck height.* (i) For the purpose of load calculations the height of a tween deck is ascertained by measuring the distance from the heel of the overhead deck beam to the heel of the underdeck beam. (The thickness of the plating forming the deck is not deducted from the height.)

(ii) For height of a tween-deck affected by the sheer of a deck, measure as above at both the forward and after ends of the hold and divide the sum of these heights by two.

(62) *Tween deck hold.* A tween deck hold is a space located between the weather deck and the lower hold.

(63) *Type "A" dunnage floor.* A type "A" dunnage floor shall be constructed of two layers of commercial 1-inch dunnage of widths not less than 4 inches fitted as close as possible, edge to edge, and butt to butt, the top course being laid crosswise to the lower course, or of a single layer of 2-inch lumber of widths not less than 6 inches fitted as close as possible edge to edge, and butt to butt. When using 2-inch lumber over hatch boards the lumber shall be laid fore and aft.

(64) *Type "B" dunnage floor.* A type "B" dunnage floor shall be constructed of one layer of commercial 1-inch thick dunnage of widths not less than 4 inches fitted as close as possible, edge to edge, and butt to butt.

(65) *Accessible stowage.* Accessible stowage is one which can enable a fire-fighting party with equipment to approach with ease.

(d) *Abbreviations.*

AA	Antiaircraft.
AAC	Antiaircraft common.
AA Com	Antiaircraft common.
AC	Aircraft cannon.
AC	Hydrocyanic acid.
A.C.E.I.S	Aircraft emergency identification signals.
A.D.F	Auxiliary detonating fuze.
AIC	Ammunition identification code (Army).
ALN	Ammunition lot number.
Amm.	Ammunition.
Ammo	Ammunition.
AP	Armor-piercing.
APC	Armor-piercing capped.
APT	Armor-piercing tracer.
ASSEM	Assembled.
AT	Anti-tank.
Aux	Auxiliary.
Aux Det	Auxiliary detonating fuze.
BBC	Bromobenzylcyanide (tear gas).
BC	Bursting charge.

BD	Base detonating.
BDF	Base detonating fuze.
BL and P	Blind loaded and plugged.
BL and T	Blind loaded and tracer.
BP	Black powder.
BUWEPS	Bureau of Weapons.
BUR CHG	Bursting charge.
CAL	Caliber.
CCIP	Case combination ignition primer.
CHG	Charge.
CG	Phosgene.
CK	Cyanogen chloride.
CL	Chlorine.
Cml–C	Chemical Corps.
CNS	Chloracetophenone solution (tear gas).
COM	Common.
Comp A	RDX-War explosive.
Comp B	RDX–TNT explosive.
Comp C	Plastic type RDX explosive.
Cor	Corrosive materials.
CPI	Case percussion igniter.
CPP	Case percussion primer.
CT–TNT	Case TNT.
D	Explosive "D" (ammonium picrate).
DA	Diphenylchlor arsine.
DC	Depth charge.
DDR	Dummy drill.
DEMO	Demolition.
DM	Adamsite (sneeze gas).
DP	Diphosgene.
EX	Experimental.
EXP	Expellant or explosive.
EXP "D"	Explosive "D".
F	Fuze.
FC	Full charge.
FFAR	Folding fin aircraft rocket.
FFFG	Fine fine fine grain (black powder).
FFG	Fine fine grain (black powder).
FG	Fine grain (black powder).
F.G	Flammable compressed gas.
F.L	Flammable liquid.
FM	FM smoke mix (titanium tetrachloride).
FNH	Flashless, nonhygroscopic.
FP	Flashless pellets.
FRAG	Fragmentation.
FS	FS smoke mix (sulfur trioxide).
F.S	Flammable solid.
GB	Isopropyl methylphosphonofluoridate (nerve gas).
GP	General purpose.
H	Mustard gas.
HBX, H6	RDX–TNT–AL type explosive.
HC	Hexachlorethane mixture (smoke).
HC	High capacity.
HD	Distilled mustard.
HE	High explosive.
HEAT	High explosive antitank.
HEI	High explosive incendiary.
HEIT	High explosive incendiary tracer.
HET	High explosive tracer.
HMX	Cyclotetramethylenetrinitramine.
HN	Nitrogen mustard gas.
HPAG	High performance air to ground (rocket).
HVAR	High velocity aircraft rocket
ICC	Interstate Commerce Commission.
ILLUM	Illuminating.
IM	Thickened gasoline.
IN	Inert.
INCEND	Incendiary.
L	Lewisite.
LC	Light case.
LE	Low explosive.
L and F	Loaded and fuzed.
L and P	Loaded and plugged.
M	Model (Army).
Maj Cal	Major caliber.
MCBD	Major caliber base detonating.
MG	Magnesium.
MIN CAL	Minor caliber.
MK	Mark.
MM	Millimeter.
Mod	Modification.
MTF	Mechanical time fuze.
NC	Nitrocellulose.
NF	Nose fuze.
NH	Non-hygroscopic.
Nonf. G	Nonflammable compressed gas.
NP	Thickened gasoline.
O/H	Overhauled.
ORD	Ordnance.
Oxy M	Oxidizing material.
PD	Point detonating.
PDF	Point detonating fuze.
PENT	Pentolite.
PERC	Percussion.
Pois. A	Poison gas or liquid, Class A.
Pois. B	Poison liquid or solid, Class B.
Pois. C	Tear gas, Class C.
Pois. D	Radioactive material, Class D.
PRAC	Practice.
PRI	Primer.
PROJ	Projectile.
PS	Chlorpicrin.
PT	Thickened fuel.
PWP	Plasticized white phosphorus.
RD	Round.
RDX	Cyclotrimethylenetrinitramine (cyclonite).
SA	Small arms.
SAP	Semi-armor piercing.
SCAR	Sub-caliber aircraft rocket.
SEIS	Ship's emergency identification signals.
SF	Semi-fixed.
SQ	Super quick.
T	Tentative model designation.
TET	Tetryl (trinitrophenylmethylnitramine).
TF	Time fuze.
TH	Thermate or Thermite.
TNT	Trinitrotoluene.
TPX	Torpex.
VT	Variable time (Proximity) (VT).
w	with.
w/o	without.
WP	White phosphorous.

[CGFR 62-11, 27 FR 5287, June 5, 1962]

EDITORIAL NOTE: For Federal Register citations affecting § 146.11 see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 146.29-13 Permit for handling military explosives.

(a) Shipments of military explosives and military lethal chemicals except material covered in § 146.29-100 as Coast Guard Class I shall not be laden on, handled nor discharged from any vessel at any port or place in the United States, its territories or possessions (not including the Panama Canal Zone) until authorization has been obtained by the owner, agent, charterer, master, or person in charge of the vessel from the District Commander of the U.S. Coast Guard, Captain of the Port, or other officer designated by the District Commander.

(b) Before a permit is issued authorizing the loading, handling or discharging of military explosives or military lethal chemicals in accordance with paragraph (a) of this section, the permittee shall file a written application for a permit authorizing the loading or handling or discharging. When filed, the application for loading or handling shall be accompanied by a preliminary manifest of all explosives or other dangerous articles comprising the cargo of the vessel together with a preliminary cargo stowage plan showing the proposed stowage of all such cargo. Changes in final stowage from that shown in the preliminary cargo stowage plan may be made upon approval of the issuing officer.

[CGFR 67-23, 32 FR 8157, June 7, 1967]

§ 146.29-14 Dangerous cargo manifest, list or stowage plan.

(a) The master of a vessel transporting military explosives shall prepare a dangerous cargo manifest, list or stowage plan. This document must be kept in a designated holder, on or near the vessel's bridge while the vessel is in the navigable waters of the United States.

(b) The information required to appear on the dangerous cargo manifest, list or stowage plan by the provisions of paragraph (c) of this section shall be the information actually furnished to the vessel by the shipper of the military explosives or hazardous munitions upon his bill of lading or other shipping paper. This shipping order shall comply with the provisions of § 146.05-12 of this subchapter.

(c) This manifest, list or stowage plan shall show thereon the following information:

(1) Name of vessel and official number. (If the vessel has no official number, the international radio call sign shall be substituted.)

(2) Nationality of vessel.

(3) True shipping name of all military explosives as specified in § 146.29-100. Noun descriptions must be used.

(4) Tonnage in bulk shipment or the number and description of the outside containers and their gross weight.

(5) Classification of the military explosives as specified in § 146.29-100.

(6) DOT label applied to the package if any required.

(7) The stowage location of the explosives on board the vessel.

(8) Signature of the Master or other officer of the vessel authorized by the Master to sign for him.

(d) When military explosives are transported on board a vessel which is transporting other hazardous materials, the manifest list or stowage plan required by this section may be incorporated in the one required by 49 CFR 176.30.

(e) The manifest, list, or stowage plan aboard the vessel shall be produced upon demand of the Commandant of the Coast Guard or his authorized representative.

(f) Owners, charterers, or agents of vessels transporting or storing military explosives or hazardous munitions shall retain ashore for one year a copy of the manifest, list, or stowage plan and shall produce said manifest or list in accordance with the provisions of § 146.02-22.

(g) Manifests for storage vessels shall be prepared according to the provisions of § 146.06-20 of this subchapter.

[CGFR 67-23, 32 FR 8157, June 7, 1967, as amended by CGFR 69-72, 34 FR 17494, Oct. 29, 1969; Amdt. 176-1, 41 FR 28122, July 8, 1976]

§ 146.29-15 Authority to load, handle or discharge; facilities and use.

(a) Military explosives, except material covered in § 146.29-100 as Coast Guard Class I, shall not be handled, stowed, stored, loaded on, or discharged from a vessel except at one of the following:

(1) Explosives anchorages; the areas upon the navigable waters that are designated explosives anchorages under the applicable provisions of 33 CFR parts 109 and 110 (Anchorage Regulations), and within which a vessel may anchor or moor to handle, stow, store, load, or discharge explosives as cargo.

(2) Designated waterfront facility of particular hazard (33 CFR 126.05(b)); the facility which has been specifically authorized by the District Commander or Captain of the Port for this purpose.

(3) Temporary location; a location the District Commander or Captain of the Port may designate as a temporary location for a specific loading of Classes XI-A, XI-B, XI-C, and XI-D ammunition.

(b) A vessel, subject to the regulations in this part, may load or discharge military explosives at any Army or Navy depot, arsenal, navy yard, port of embarkation or other facility under the direct control and operation of the Navy, or Army, provided a permit authorizing such loading has been granted to the vessel owner, agent, charterer, master, or person in charge of the vessel by the Captain of the Port. (See §§ 146.29-19 and 146.29-21.)

(c) In an emergency arising by reason of military necessity or casualty, a vessel may upon authorization by a Captain of the Port, load or discharge military explosives in any location authorized by said Captain of the Port.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 68-66, 33 FR 8452, June 7, 1968]

§ 146.29-17 Prohibited explosives.

(a) Explosives prohibited by subsection 3 of R.S. 4472, as amended (46 U.S.C. 170) (fulminates or other detonating compounds in bulk in dry condition, or explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 167 degrees Fahrenheit, or compositions containing an ammonium salt and a chlorate, or other like explosives) shall not be accepted by any vessel.

(b) A passenger vessel shall not accept any Class A or Class B military explosives for transportation as cargo.

§ 146.29-19 Explosives loading supervisory detail.

(a) There may be assigned to every vessel, subject to the regulations in this part, loading, handling, or discharging military explosives at an explosives anchorage or waterfront facility as may be approved by the Captain of the Port or the District Commander for the loading or unloading of military explosives, a Coast Guard detail to supervise such loading, handling or discharging. The owners, agents, charterers, masters or persons in charge of the vessel and all persons engaged in the handling, loading and stowage of the military explosives shall obey all orders, oral or written, that are given by the person in charge of such assigned detail.

(b) A vessel, subject to the regulations in this part, loading, handling, or discharging military explosives except material covered in § 146.29-100 as Coast Guard Class I at a Navy or Army depot, arsenal, navy yard, port of embarkation or other facility under the direct control and operation of the Navy or Army shall apply to the Captain of the Port for a permit for such loading, handling or discharging. A Coast Guard detail may be assigned to such a vessel unless the Commanding Officer of such Navy or Army facility declines the detail.

§ 146.29-21 Personnel identification.

The provisions of this section shall apply to vessels loading, handling or discharging military explosives in accordance with the provisions of § 146.29-19(a).

(a) No person shall enter upon a vessel loading, handling, or discharging military explosives unless such person first identifies himself to the satisfaction of the Coast Guard detail.

(b) Every person who is permitted to enter into a magazine or a hold or compartment of a vessel wherein military explosives are being handled or stowed shall provide the Coast Guard representative with his name and address and the name and address of the firm employing him, furnishing satisfactory identification to substantiate such information.

(c) A person who, for any reason, is requested to leave a vessel loading, handling or discharging military explosives by the person in charge of the Coast Guard detail shall immediately obey the request and not return until permission is granted.

§ 146.29-23 Ship's officer present.

(a) During the entire operation involving the building of a magazine, the preparation of holds, and the actual handling and stowage of military explosives, it shall be the responsibility of the master of the vessel to assign a deck officer of the vessel who shall be in constant attendance. It shall be these officers' responsibility to see that the provisions of the regulations in this part insofar as such provisions apply to the vessel, are complied with.

(b) It shall be these officers' further responsibility at the end of the work shift to see that all means of access to the partially loaded holds are closed off in such a manner as to provide the maximum safety and protection for the explosives stowed within the hold.

§ 146.29-25 Fires and fire protection.

(a) No unnecessary fire shall be permitted on a dock, lighter, or vessel while loading, handling, or discharging military explosives.

(b) Every fire deemed necessary must be properly safeguarded and for the entire period of cargo transfer shall be in constant charge of a competent person assigned for that purpose by the master or by the person in charge of the vessel or by the person in charge of the dock.

(c)(1) Every vessel engaged in the handling and transfer of military explosives and equipped with means for power, heating, cooking, or lighting involving use of smoke pipes or stacks shall have such smoke pipes and/or stacks protected by spark screens. For the purpose of screening smoke pipes, vessels shall be divided into two categories. Large or ocean vessels shall have their main smoke pipes protected by corrosion resistant screens of not larger than ½-inch mesh and small or inland vessels and small or auxiliary smoke pipes on large vessels by screens not larger than ¼-inch mesh.

(2) Insofar as practicable, unless the barge, lighter, etc. is loading or discharging military explosives to or from the vessel, barges, lighters, towboats, and other types of vessels shall not come alongside a vessel handling, stowing, storing, loading, discharging or transporting military explosives opposite the area where hatches serving a hold containing explosives are open. (See § 146.29-73(f).)

(3) This paragraph is not applicable to vessels transiting main channels contiguous to explosives loading facilities or anchorages.

(4) Vessels loading or unloading Class I ammunition at waterfront facilities not designated by the Captain of the Port as explosives loading piers do not require screening of smoke pipes and/or stacks.

(d) Welding or cutting operations involving the use of open flames or arc shall not be undertaken on a vessel having military explosives on board as cargo, except in case of an emergency affecting the security of a vessel, or for the purpose of welding pad eyes, angle bars or other devices to the deck for securing deck cargo. Such welding or cutting shall be done only on special permission of the Captain of the Port, and then only in the presence of an officer of the Coast Guard detail and in conformity with said officer's instructions.

(e) The cleaning of fireside of boilers shall not be undertaken on a vessel while at an explosives or ammunition loading facility or anchorage except upon express permission of the Captain of the Port.

(f) All tubes and uptakes of the vessel must be thoroughly swept or blown and reasonably free of soot prior to the arrival of the vessel at an explosives or ammunition loading facility or anchorage. A vessel at an explosives ammunition loading facility or anchorage shall not blow tubes or uptakes except upon permission of the Captain of the Port and then the operation shall be under the supervision of the master or person in charge of the vessel with a licensed engineer in attendance.

(g) Bunkering of a vessel shall not be done while the vessel is at an explosives loading or ammunition loading waterfront facility. When at an anchorage, an explosives laden vessel may engage in bunkering operations provided explosives are not being loaded, handled, or discharged, and all holds in which explosives are stowed are secured.

(h) A vessel at an explosives or ammunition loading facility or anchorage shall not transfer fuel oil between its own fuel oil storage tanks or from its storage tanks to the settling tank, except under the close supervision of a licensed engineer who shall be in constant attendance until the operation is completed.

(i) [Reserved]

(j) The transfer of lubricating oils and cleaning oils, either from containers on board the vessel or by pipeline or hose shall be prohibited at an explosives or ammunition loading facility. However, the transfer on board the vessel of galley fuel oil may be authorized by the Captain of the Port when the galley stove is cold, or when the vessel is equipped with an overflow system which returns surplus fuel oil from the galley tanks back into the main storage tanks provided such transfer is under the supervision of the master or person in charge of the vessel with a licensed engineer in attendance.

(k) The fueling of powered lifeboats or units of the vessel's machinery shall not be done while the vessel is at an explosives or ammunition loading facility.

(l) Boiler room and engine room bilges must be clean and free of oil or unnecessary residue before the vessel proceeds to an explosives or ammunition loading facility or anchorage, and it is further required that the bilges be maintained in this condition during the entire time the vessel is moored at the explosives or ammunition loading facility or anchorage. Attention is invited to the provisions of the Oil Pollution Acts of 1924 and 1961, and the Refuse Act, 1899, which prohibit the discharge of oil into the navigable waters of the United States. The term "oil" means oil of any kind or in any form, including fuel oil, oil sludge, and oil refuse.

(m) On every vessel located at explosives loading facility or anchorage or ammunition loading facility no work shall be undertaken on the main propulsion machinery, auxiliaries or boilers that will render inoperative fire pumps, electric power or propulsion of the vessel without express authority of the Captain of the Port. When the repairs authorized make inoperative the main propulsion unit an auxiliary tug shall stand by.

(n)(1) Every self-propelled vessel having on board military explosives shall at all times maintain means of propulsion. When not under way, such a vessel shall have available on deck, fore and aft, hawsers capable of being used for emergency towing. The eye of such hawser shall be clear of the chock with messenger attached and ready to run and the ship's end shall be stopped off on the bitts to permit reasonable scope of hawser for towing. A heaving line made up and secured to the rail by rope yarn shall be bent to the messenger. Fire axes shall be kept conveniently at hand, fore and aft, to be used on the ship or passed to the dock for cutting mooring lines in case of an emergency.

(2) Nonself-propelled vessels having onboard military explosives when moored or anchored shall have at least one tug for each facility or area at which they are moored or anchored.

(o) Every vessel loading or unloading military explosives shall display at its masthead by day a red flag at least 16 square feet in area or at least 10 feet above the upper deck if the vessel has no mast, and at night, while fast to a dock, a red light in the position specified for the flag.

(p) Any device, such as a radio, radar, etc. capable of radiating electromagnetic energy shall be de-energized by opening the main switches thereto, and these switches shall be tagged to warn personnel against reenergizing the circuits whenever the vessel is at an explosives or ammunition handling facility, at an explosive anchorage with a barge or other type of vessel containing explosives alongside, or when a hatch containing explosives is uncovered.

§ 146.29-27 Fire hose.

(a) During the handling, loading, or unloading of military explosive the vessel shall "run out" or otherwise make ready for quick use a minimum of two lines of hose on the weather deck, one fore and one aft. These hoses shall be of sufficient length so that a stream of water from at least one hose can reach all areas of the weather deck. The fire hose valves controlling these lines shall remain "cracked open" (except in freezing weather) so casual observation may indicate that water is available.

(b) Additional fire lines shall be "run out" or otherwise made ready at each hold or compartment working or containing military explosives when the hatch serving the hold is open. These lines shall be of sufficient length so that a stream of water can be directed onto all portions of the hold or compartment.

(c) Fire lines "run out" or otherwise made ready shall be fitted with an approved combination spray nozzle.

[CGFR 69-72, 34 FR 17494, Oct. 29, 1969]

§ 146.29-29 Smoking.

(a) Smoking is prohibited on or near any vessel handling, loading or unloading military explosives at an explosives or ammunition loading pier. Smoking areas may be designated upon approval by the Captain of the Port provided such areas are located at a safe distance from the vessel. "No Smoking" warning signs shall be posted during operations of handling, loading or unloading such cargo. At least one such "No Smoking" sign shall be located on the pier at a reasonable distance from the vessel when such handling, loading, or unloading is taking place at a pier.

(b) Smoking is prohibited on or near any vessel handling, loading, or unloading explosives at an explosives anchorage, except the Captain of the Port may, with the concurrence of the master or person in charge of the vessel, designate a compartment as a smoking area. This compartment will be provided with electric lighting devices without open flame. "No Smoking" warning signs shall be posted conspicuously in other parts of the vessel during operations of handling, loading, or unloading.

(c) The Captain of the Port may approve a room aboard ship to be a designated "Smoking room for the ship's personnel only," while at a pier or anchorage; provided the necessary approved firefighting equipment is at hand and portholes, vents, and doors are effectively screened with approved screening and electric cigarette lighting devices without open flame are provided.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8158, June 7, 1967]

§ 146.29-31 Liquor or drugs.

No person who, in the judgment of the master, person in charge of the vessel, or the officer in charge of the Coast Guard detail, is considered as being under the influence of intoxicating liquor or of drugs shall be permitted onboard a vessel while operations involving the handling, loading, unloading, or transportation of explosives are being carried on, except if the person under the influence of intoxicating liquor or drugs is a bona fide member of the crew of the vessel involved, he may at the discretion of the Officer-in-Charge of the Coast Guard detail board the vessel: *Provided*, That the master or person in charge of the vessel will accept custody and full responsibility for said person: *And provided further*, That this person shall not be permitted to perform any work on the vessel while under the influence of intoxicating liquor or drugs.

§ 146.29-33 Cargo working gear and equipment.

(a) Before military explosives are loaded or unloaded on or from a vessel the master or other person in charge of the vessel is required to ascertain by examination the adequacy, the condition and working order of all working equipment including slings, crates, baskets boxes, chutes, mattresses, and tackle.

(b) Any and all equipment, which in the judgment of the master or other person in charge of the vessel is not adequate or in safe working condition shall be rejected by him and he shall prohibit its use and shall take such precautions as he may deem necessary to be certain such rejected equipment is not used for the purpose of loading or unloading explosives. The master or other person in charge of the vessel shall keep watch of all equipment used during the transfer of explosives and if any part of the equipment shows any defect or is damaged in use, work shall be stopped and the damaged or defective equipment repaired or replaced before permitting the loading or unloading to continue.

(c) This inspection of cargo working equipment shall apply to the vessel's equipment and to stevedore's or other contractor's equipment.

(d) The Captain of the Port or his representative may prohibit the use of any cargo working gear or equipment, including stevedore equipment, which he deems unsafe.

§ 146.29-35 Lights, tools, and portable equipment.

(a) No artificial lights except electric lights, electric lamps, or electric floodlights shall be used while loading or unloading military explosives. Such light fixtures shall not be used unless protected against accidental breakage by metal guards. Portable electric lights shall be fitted with stout guards protecting the bulb. Wires of such lights shall be sound and show no evidence of liability to short circuit. When deemed necessary by the military service concerned with the shipment of the explosives due to the possible presence of explosive dust or vapors in the hold of the ship being worked, all electrical equipment and light fixtures used therein shall be of a type approved for the hazardous location as defined in the National Electric Code. This equipment shall be grounded and continuity of the grounding system assured by the applicable methods prescribed in the National Electric Code.

(b) Portable lights shall be so installed as to prevent any part of the light or its cable from coming in contact with the deck or the cargo. A hanging portable light shall not be suspended from its cord but shall be fitted with a gantline so installed that no strain is carried by the light cable. No portable light shall be taken into a hold or compartment in which the stowage of ammunition or explosives has been completed without prior approval by the Captain of the Port or his representative. A portable light and light cord that is permitted in a hold shall; be installed in a manner which will prevent the light cord from coming into contact with the ship's metal surface; be guarded and protected from damage that may be caused by the ship's working gear or stevedore handling equipment; and shall not be permitted to be in bearing with any of the ammunition, explosives or hazardous munitions or containers thereof.

(c) Flashlights of a non-spark type shall be provided by the vessel owner, agent or its master or other person in charge of the vessel, for personnel required to enter holds in which explosives are stowed.

(d) Members of the crew of the vessel and other persons permitted on board the vessel to aid and assist in loading, unloading or handling military explosives shall not be permitted to carry on their persons firearms, matches, flame producing devices, knives, bale hooks, metallic tools except as provided in paragraph (e) of this section or personal packages of any description, except the prohibition against knives shall not apply to the seaman's knife in possession of a member of the crew of the vessel, provided such crew member is not actually working the explosives or ammunition. Lunch boxes, pails, thermos bottles, other food containers or personal packages of any description shall not be brought on board a vessel unless such items have been examined and passed by the Coast Guard detail. Food containers that are passed on board the vessel shall not be stored in the hold in which explosives are being worked nor shall their contents be eaten in such hold. Persons engaged in handling and stowage of military explosives shall not wear shoes or boots shod or strengthened with iron nail or other spark producing metal unless such footwear is covered with rubber, leather, or other nonsparking material.

(e) The Captain of the Port may authorize the use of pinch bars of ferrous metal in "breaking out" or stowing unfuzed bombs, large caliber separate loading projectiles, and packages of ammunition shipped in heavy unit weight containers. He may also permit the use of saws and hammers that are actually powered by the hand or hand and arm, in the hold of a vessel when necessary in fitting dunnage or constructing a partition or a division bulkhead or installing protection required for the stowage of military explosives. The Captain of the Port may authorize spark-proof electrically powered or pneumatic saws or hammers, but they shall not be used in any compartment containing military explosives. The Captain of the Port or his representative may authorize the use of metallic tools on deck in the vicinity of the hatch for necessary work associated with the loading, such as winch repairs, opening or tightening shackles, etc.: *Provided*, That they are removed from the scene as soon as the work is completed.

(f) All electric wiring in holds in which explosives are to be stowed shall be inspected prior to the loading of explosives into the hold. The electrical circuits which terminate in or service holds in which explosives are to be stowed shall be deenergized by removing their fuses or inactivating their circuit breakers at the main panel prior to loading and these circuits shall remain deenergized while explosives are within the hold. The main panel shall be tagged to warn personnel against reenergizing these circuits.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR, 67-23, 32 FR 8158, June 7, 1967; CGFR 68-66, 33 FR 8452, June 7, 1968]

§ 146.29-37 Handling drafts of lumber.

All lumber in excess of 3 feet in length shall be handled into or out of the holds of vessels loading, unloading or containing military explosives or ammunition by use of a double sling. Small pieces of lumber used in chocking and dunnaging shall be handled in trays with sideboards. Cargo nets may also be used provided they are lined with canvas or similar fabric. Dunnage shall not be lowered directly onto stowages of ammunition or explosives. Landing mats or timbers shall be laid to receive such drafts.

§ 146.29-39 Handling and slinging of explosives.

(a) All military explosives or chemical warfare agents in bulk shall be handled carefully. Packages and other containers shall not be dropped, dragged, tumbled, walked, slid over each other or over the deck or otherwise subjected to shock except that heavy containers of military explosives equipped with pulling bar assemblies and skids may be positioned in the holds of vessels by using the pulling bar assemblies to maneuver the containers for short distances at slow speed. Packages and other containers shall not be rolled unless rolling is specifically permitted by the provisions governing handling as set forth in § 146.29-100.

(b) In transferring military explosives between pier facilities and vessels or from vessel to vessel, or within the hold of a vessel the items may be handled by hand, power operated mechanical hoist or power operated conveyor approved by the Captain of the Port, power operated cargo lift truck, hand truck or nonpowered (gravity) roller conveyor (hand controlled); or unless specifically prohibited by the regulations in this subpart, a specification chute and mattress may be used. (Refer to §§ 146.09-11 and 146.09-12 for specifications of chute and mattress.)

(c) Classes III, VI, VIII, and IX-C shall be lowered carefully onto a mattress or other shock absorbing material.

(d) The Captain of the Port may permit the use of cargo-handling vehicles or equipment powered by internal combustion engines on docks, wharves or piers for the handling of military explosives under such conditions as he may prescribe. Such type vehicles or equipment shall not be used within a hatch of a vessel having military explosives in any hold within said hatch. Electric or battery powered vehicles or equipment of explosion-proof or spark-proof type, such as approved power-operated industrial trucks with recognized testing laboratory designations of "EE" and "EX" may be used to handle military explosives on docks, wharves, piers or in the holds of vessels under such conditions as the Captain of the Port may prescribe. All power-operated cargo-handling vehicles or equipment shall at all times be maintained in safe mechanical, electrical and operating condition. The use of cargo-handling vehicles or equipment may be suspended or prohibited by the Captain of the Port or his representative when he considers such use inimical to safety.

(e) When handling, loading or unloading by mechanical means, all military explosives shall be handled in the type equipment specified for the various classes of explosives in § 146.29-100. Military explosives shall be arranged on trays so that no portion of the military explosives or containers overhangs the tray. For trays provided with sideboards, military explosives or containers shall not extend above the sideboards to a height exceeding one-third of the vertical dimension of the item as stowed on the tray. Rope net slings with pieplates, pallet, skipboard or similar base shall be so loaded that when lifted a minimum displacement of items shall occur and the cargo net shall completely encompass the entire load except on its topside.

(f) The mesh of a cargo net shall be of such size as will prevent any item or container of military explosives in the draft from passing through the mesh under any possible circumstances.

(g) Drafts shall not be raised or stopped in lowering by sudden application of power or brake. Drafts shall not be unloaded by tripping or freeing one side of the net, tray, or pallet and tumbling the ammunition or explosives out of the gear. All drafts, beams, shackles, bridles, slings, hooks, etc., shall be hand freed before the winch takes control. Slings shall not be disengaged by hand unhooking and then dragged from under draft by means of winch except for the topmost layer in the hold when power removal is the only possible method and when the cargo cannot be toppled. Handles or beckets on ammunition packages shall not be used for slinging purposes.

(h) Blasting caps, detonators, primer-detonators, fulminate of mercury and initiating or priming explosives as defined in the regulations in this part shall be considered as constituting a distinct class of dangerous explosives, and because of the hazard involved they shall be handled with extreme care.

(i) [Reserved]

(j) "Cant" or barrel hooks shall not be used for raising or lowering a barrel, drum, depth bomb, depth charge or other container of military explosives. Metal bale hooks shall not be used in handling packages of explosives.

(k) Combination woven rope and wire slings are not permitted for use in handling explosives. A sling that is formed by use of an open hook shall not be used in hoisting or lowering a draft of military explosives.

(l) Wire rope or wire rope assemblies including splices or fittings thereof, used in handling military explosives shall be kept bare to permit ready inspection of its safe working condition. Mechanical type endings may be used in lieu of hand splices provided such endings have a minimum breaking strength equal to the catalog strength of wire rope from which it is made.

(m) Bombs shall not be handled by the lifting lug or suspension lugs.

(n) Only safety hooks or hooks that have been moused by wire shall be utilized in loading or discharging drafts of military explosives or munitions.

[CGFR 62-11, 27 FR 5287, June 5, 1962]

EDITORIAL NOTE: For FR citations affecting § 146.29-39 see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 146.29-41 Weight per draft.

To eliminate excessive drift, slings will be as short as practicable when handling military ammunition or explosives. The maximum permitted weight per draft of all classes of military explosives shall be as follows for a 5-ton boom. The weights per draft may be increased proportionately for booms of greater capacity. In all instances the allowance shall remain as 10 percent. For example, in paragraph (d)(2) of this section, the maximum weight of drafts consisting of one or more palletized units of Class V or VII military explosives shall not exceed 4,400 pounds when using a 5-ton boom; however, if a 10-ton boom is used the weight of the draft may be increased to 8,800 pounds (8,000 pounds plus 10 percent of same).

(a) *Class I.* (1) When handled by pallet, skipboard, or tray fitted with cargo net or sideboards shall not exceed 3,000 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(b) *Classes II-A, II-B, II-C, II-D, II-E, II-F, II-G, II-H, II-J, IV, IX-A, IX-B.* (1) When handled by pallet, skipboard, tray, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(c) *Classes III, VI.* (1) When handled by tray fitted with sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(d) *Classes V, VII.* (1) When handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(3) Single shells weighing in excess of 2,200 pounds must be loaded or unloaded one at a time.

(e) *Class VIII.* (1) When handled by tray fitted with sideboards shall not exceed 1,000 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 2,400 pounds plus 10 percent.

(3) The maximum permitted weight for lift of a portable magazine containing Class VIII ammunition shall not exceed 2,400 pounds plus 10 percent.

(f) *Class IX-C.* (1) When handled by tray fitted with sideboards shall not exceed 1,000 pounds plus 10 percent.

(2) The maximum permitted weight for purpose of lift of a portable magazine containing IX-C explosives shall not exceed 2,400 pounds plus 10 percent.

(g) *Classes X-A, X-B, X-C, X-D.* (1) When handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) When handling bombs, more than one to a draft, by sling method or in palletized units, the draft shall not exceed 4,000 pounds plus 10 percent.

(3) Table of limiting loads applicable when handling bombs by sling method:

Weight of individual bomb or cluster	*Maximum limits in units per 1 draft*
1 pound to 250 pounds plus 10 percent per unit	8
276 to 500 pounds plus 10 percent per unit	6
551 to 1,000 pounds plus 10 percent per unit	4
1,101 to 2,000 pounds plus 10 percent per unit	2
Over 2,200 pounds	1

(4) Single items or assembled units (other than palletized), designed to be handled as a unit, may be loaded regardless of weight provided the cargo handling gear is of a design capable of handling a working load at least 50 percent additional to the actual weight of the item or unit comprising the draft, and provided further the integrity of the cargo handling gear is unimpaired.

(h) *Classes XI-A, XI-B, XI-C, XI-D.* (1) When handled by trays, skipboards, pallets or pieplates fitted with cargo nets or sideboards shall not exceed 2,400 pounds plus 10 percent.

(2) Drafts consisting of one or more palletized units shall not exceed 4,000 pounds plus 10 percent.

(3) Single bombs or other unit containers weighing in excess of 2,200 pounds must be loaded or unloaded one at a time.

(i) [Reserved]

(j) A tray with a top and so constructed that it may be considered equivalent to a palletized unit may, subject to the approval of the Captain of the Port, be permitted a maximum weight per draft of 4,000 pounds plus 10 percent. This top may be constructed of other material than the tray, provided it serves to make the tray an integral unit.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGD 71-12a, 37 FR 14586, July 21, 1972]

§ 146.29–42 Containers of ammunition.

Containers or portable magazines containing explosives of Coast Guard Classes I and II, designed to be loaded and discharged in a loaded condition by "lift-on, lift-off" method may be handled regardless of weight provided the rated working capacity of the cargo handling gear is not exceeded and provided further that the integrity of the handling gear is unimpaired. The volume of explosives that may be stowed in a container is not limited unless the container is being used as a portable magazine as described in § 146.29-89. Where the regulations of this subpart require magazines, containers may not be used for stowage purposes unless they comply with magazine requirements. All other classes of military explosives may be carried in containers on approval of the Commandant.

[CGD 71-12a, 37 FR 14586, July 21, 1972]

§ 146.29–43 Requirement for the opening of hatches.

(a) *Vessels at explosives loading piers or at ammunition loading piers.* (1) A weather deck hatch through which ammunition or explosives are being worked shall have sufficient hatch covers and hatch beams removed across the entire width of the hatch so that the resulting opening, measured parallel to the side of the vessel, is at least equal to twice the longest axis of the largest draft being loaded.

(2) Strongbacks or hatch beams left in place shall be firmly secured by hatch batten or other approved means.

(b) *Vessels at explosives anchorages.* A weather deck hatch through which ammunition or explosives are being worked shall have all hatch covers and all hatch beams removed unless otherwise authorized by the Captain of the Port.

(c) *Vessels at explosives anchorages having a magazine constructed in the square of a weather deck hatch.* Sufficient hatch covers and hatch beams shall be removed from the weather deck hatch to expose the entire magazine.

(d) *General requirements.* (1) During the working of ammunition and explosives to or from the deep holds, the 'tween-deck hatch openings shall at all times be equal to, if not greater than, the weather deck hatch openings.

(2) The use of open hooks in removing or replacing hatch beams or hatch strongbacks is prohibited. Closed hooks, shackles or T bars shall be used in this operation.

§ 146.29–45 Loading or unloading military explosives and other cargo.

(a) Military explosives shall not be loaded or unloaded in a hatch at the same time that other cargo is being worked in any of the holds serviced through said hatch.

(b) Military explosives shall not be loaded or unloaded from the same hatch from both sides of the ship simultaneously, unless the hatch is fitted with cargo handling gear located at both the forward and after ends of the hatch. A vessel so equipped may also use both sets of cargo handling gear simultaneously from the same side of the vessel.

(c) When military explosives are stowed in a hold below one in which any cargo is being worked the 'tween-deck hatch dividing the two holds will have all of its covers securely in place.

(d) Military explosives may be loaded in a hold before or after other cargo, provided that all precautions are taken to assure full protection to the explosives against the hazard of articles being dropped from the cargo sling. When possible hatches should be partially covered to assure such protection.

(e) Drafts of any kind shall not be handled over explosives or other dangerous articles that are stowed "On deck".

(f) Any deck loads over which military explosives must be passed shall be limited in height to that of the hatch coaming, bulwark, or three feet, whichever is greater.

(g) Drafts of explosives may not be handled over explosives or other dangerous articles which have been placed on deck permanently or temporarily.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 69-72, 34 FR 17494, Oct.

29, 1969; CGD 71-12a, 37 FR 14586, July 21, 1972]

§ 146.29-47 Packing and marking.

Military explosives shall not be offered to vessels or accepted by vessels subject to the regulations in this part unless they are in proper condition for transportation and are packed, marked, labeled, described, certified and otherwise acceptable in accordance with the applicable provisions of the regulations in this part.

§ 146.29-49 Stowage on board barges.

(a) Barges subject to the regulations in this part, engaged in the transfer of explosives between receiving points and delivery points within the harbors, bays, sounds, lakes, and rivers, including the explosives anchorages on the navigable waters, shall conform to the applicable provisions of 49 CFR 176.95 through 176.99. Ammunition or explosives in bulk, in combustible outside packages, stowed "On deck in open" shall after loading and during transportation be covered by fire resistant and/or flame proof tarpaulins securely lashed in place.

(b) Notwithstanding the requirements of this subpart relative to the stowage of detonators, blasting caps and fuzes, Class VIII, such articles may be stowed "On deck" on Class AA and Class AB barges with other ammunition or explosives in bulk stowed thereon, provided a sandbag barrier of at least 2 feet in thickness intervenes between the ammunition or explosives in bulk and the detonators, blasting caps or fuzes. When both are stowed "On deck" the height of this barrier shall be at least equal to the height of the stowage of the detonators, blasting caps or fuzes, or the ammunition or explosives in bulk, whichever is highest. The barrier shall either completely surround the detonators, blasting caps or fuzes or extend across the width of the barge. With this type of barrier no additional separation is required. For Class AC barges, the stowage of detonators, blasting caps or fuzes, Class VIII, shall, when no permanent steel bulkhead intervenes, be separated from the stowage of ammunition or explosives in bulk by a distance of 40 feet; with a permanent steel bulkhead intervening, detonators, blasting caps or fuzes shall be separated from the stowage of explosives in bulk by a distance of 25 feet and from the stowage of ammunition by a distance of 10 feet. If, under deck, a 2-foot sandbag barrier is utilized to intervene between the stowage of ammunition or explosives in bulk, it shall be considered as though a permanent steel bulkhead or deck intervenes. Notwithstanding the provisions of 49 CFR 176.98, Class CA and Class CB barges may transport ammunition on deck.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by Amdt. 176-1, 41 FR 28122, July 8, 1976]

§ 146.29-51 Stowage on board vessels.

(a) All articles of cargo classified as military explosives by the regulations in this subpart shall be stowed on board a vessel in conformity with the provisions of the regulations in this subpart.

(b) Mixed stowage of ammunition or explosives in bulk with other ammunition or explosives, or other dangerous articles or substances, or combustible liquids or hazardous articles shall be in conformity with the provisions of the explosives and hazardous munitions admixture charts, § 146.29-99, the classification, handling and stowage chart § 146.29-100 and other applicable specific provisions of this subpart. A military explosive or hazardous munition shall not be stowed in the same van or cargo transporter with any other explosive or dangerous article with which it is incompatible according to the regulations in this part. Stowage of vans containing military explosives and hazardous munitions shall follow the compatibility requirements of §§ 146.29-99 and 146.29-100.

(c) Specifications governing construction and location of magazines and lockers and the preparation of cargo compartments to be used in the stowage of military ammunition are detailed in §§ 146.29-71 to 146.29-95, inclusive.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8158, June 7, 1967]

§ 146.29-53 Stowage of military explosives in holds containing coal.

Unless expressly authorized by the Commandant of the Coast Guard military explosives shall not be stowed in a hold containing coal as cargo not in any hold above, below or adjacent to one containing coal.

§ 146.29-55 Stowage of military explosives in holds containing household or personal effects and/or mail as cargo.

(a) Unless expressly authorized by the Commandant of the Coast Guard, military explosives shall not be stowed in a hold containing household or personal effects and/or mail as cargo, nor in the hold above or below the hold containing any of these items.

(b) Military explosives may be stowed in a compartment or hold adjacent to one containing household or personal effects. However, if the explosives are stowed up to or against the intervening permanent bulkhead, a buffer consisting of at least three feet of non-dangerous cargo shall be placed between the household or personal effects or mail and the permanent bulkhead intervening between this stowage and the explosives. If non-dangerous cargo is not available for this purpose, a division bulkhead shall be erected to provide an air space of at least one foot wide between the household or personal effects, or mail, and the intervening permanent bulkhead.

(c) This section shall not apply to vessels having on board military explosives of Coast Guard Class I category only.

[CGFR 64-20, 29 FR 6797, May 23, 1964]

§ 146.29-57 "On deck" stowage.

(a) Articles classified as military explosives, the stowage of which is permitted "On deck" by the regulations in this subpart shall be properly secured. Such security may be obtained by using existing vessel's structures such as bulwarks, hatch coamings, shelter deck and poop bulkheads, as part boundaries and effectively closing in the cargo by fitting angle bar closing means, secured by bolting to clips or other parts of the ship's structure. Lashing of deck stowage permitted provided eye pads are fitted to carry such lashings. Guard rails shall not be used to secure such lashings.

(b) Bulky articles may be secured by lashing with individual wire rope lashing or other equally efficient means.

(c) Shoring of such bulky articles of cargo shall be in addition to the foregoing means of securing.

(d) Military explosives stowed "On deck" shall not be stowed within a distance of 20 feet of an incinerator, the topside terminus of an ash hoist or a coal or oil fire galley or bake shop. For vessels fitted with electrically operated galleys and bake shops, the military explosives stowed on deck may be stowed not closer than 10 feet of such galleys and bake shop provided no incinerator or topside terminus ash hoist is within a distance of 20 feet of such stowage.

(e) Deck boxes, portable magazines, containers or cargo transporters containing military explosives shall meet the requirements of this section when stowed "On deck." Compatibility of the explosives within the deck box, portable magazine, cargo transporters or containers shall be in accordance with §§ 146.29-99 and 146.29-100. A deck box, portable magazine, container or cargo transporter containing military explosives shall be separated from other deck boxes, portable magazines, containers or cargo transporter containing explosives of incompatible classes by the superstructure or, if the height of the container does not exceed that of the hatch coaming, by the weather deck hatch. Fire plugs, sounding pipes and access ways shall be maintained free and clear.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8158, June 7, 1967; CGFR 70-143, 35 FR 19960, Dec. 30, 1970]

§ 146.29-59 Stowage adjacent to other dangerous articles.

As noted in § 146.29-11, missile and rocket fuels or oxidizers listed in Classes XI-C and XI-D of § 146.29-100 are excluded from the provisions of this section when shipped with military explosives, and compatibility will be in accordance with the chart in § 146.29-99.

(a) *Flammable liquids.* (1) Military explosives shall not be stowed in the same hold, nor in any hold below, any hold above or a hold adjacent to one in which flammable liquids are stowed. Military vehicles including ducks, buffaloes, alligators and similar amphibious types of craft, referred to in this subpart as "vehicles" or "military vehicles", using a flammable liquid as fuel may be stowed in holds adjacent to a hold in which military explosives are stowed provided the fuel is confined to the vehicle's tank and is not in excess of approximately 75 percent of the capacity of the fuel tank.

(2) Military vehicles, landing craft and small boats using flammable liquid as fuel and having the fuel confined to the vehicle's or boat's tank and not in excess of approximately 75 percent of the capacity of said tank may be stowed "On deck" over a hold in which military explosives are stowed: *Provided,* That the weather deck is tight and the cargo hatch is fitted with a tight raised coaming and that such stowage is not made over the square of the hatch, except that amphibious type vehicles, landing craft or boats having fuel tanks installed within a tight hull may be stowed over the square of a hatch.

(3) Flammable liquids as cargo shall not be stowed "On deck" immediately above a hold in which military explosives are stowed. The applicable provisions of 49 CFR Part 176, inclusive, shall be observed in the stowage of flammable liquids "On deck".

(b) *Flammable solids, oxidizing materials, or organic peroxides.* (1) Military explosives shall not be stowed in the same hold nor in any hold above or below or a hold adjacent to one in which flammable solids, oxidizing materials, or organic peroxides are stowed except as specifically authorized by the provisions of § 146.29-100.

(2) Flammable solids, oxidizing materials, or organic peroxides may be stowed "On deck" over a hold in which military explosives are stowed: *Provided,* That the weather deck is tight and the cargo hatch is fitted with a tight raised coaming and such stowage is accomplished by means of a crib and platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur: *And provided further,* That such stowage is not made over the square of the hatch.

(c) *Corrosive materials.* (1) Military explosives shall not be stowed in the same hold nor in the hold below one in which corrosive materials are stowed except as specifically authorized by the provisions of § 146.29-100. Corrosive materials may be stowed "On deck" over a hold in which military explosives are stowed: *Provided,* That the weather deck is tight and the cargo hatch is fitted with a tight raised coaming and such stowage is accomplished by means of a crib and a platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur: *And further provided,* That such stowage is not made over the square of the hatch.

(2) The substances listed below shall not be transported on board a vessel which is carrying in excess of 100 tons of ammunition or explosives:

Acid sludge.
Bromine.
Chloracetyl chloride.
Dimethyl sulfate.
Hydrofluoric acid, anhydrous.
Nitrating (mixed) acid.
Nitric acid.
Phosphorus oxychloride.
Phosphorus tribromide.
Phosphorus trichloride.
Spent acid (sulfuric or mixed).
Sulfur chloride.

(d) *Military vehicles and privately owned vehicles shipped by, for, or to the United States Department of Defense with electrolyte.* Notwithstanding the provisions of 49 CFR part 176, electrolyte of not over 47 percent strength (39° Baume) may be accepted for transportation and be stowed on board vessels carrying military explosives under the following conditions of packing:

(1) In glass or earthenware containers, not exceeding 160 ounces capacity (one imperial gallon) in fiberboard cartons of a size to permit cushioning with an incombustible, absorbent ma-

terial of a sufficient amount to absorb the contents of the container in event of breakage. The outside container shall consist of a wooden box (DOT-15A, 16B or Army Specification) in which 1, 2, 3, or 4 fiberboard cartons may be packed. Battery electrolyte may also be shipped in one-gallon polyethylene bottles made and packaged in accordance with Military Specification 207B, Type IV, Class I. The outside containers shall carry the white (acid) label. No military ammunition shall be included within this package.

(2) Electrolyte packed in accordance with provisions set forth in paragraph (d)(1) of this section may be stowed:

(i) "On deck in open" including deck areas over holds containing military explosives.

(ii) "Tween-deck" or "Under deck" in holds adjacent to or in any hold below a hold containing military explosives.

(3) Electrolyte, when packed in accordance with the provisions of paragraph (d)(1) of this section, may be accepted for transportation when securely fastened within or on a military vehicle or other military equipment whether such vehicle or equipment is shipped crated, boxed, or without crating or boxing. Such military vehicles or military equipment, when shipped crated or boxed, may be accepted for transportation when the container of electrolyte is securely fastened on the inside of the shipping crate or box containing the vehicle or military equipment. When so shipped, the overall crate or box shall carry the white (acid) label and shall be marked "This side up" and "Inside packages comply with prescribed specifications."

(4) Electrolyte packed in accordance with the provisions of paragraph (d)(1) of this section when offered for transportation under the conditions set forth in paragraph (d)(3) of this section, may be stowed as follows:

(i) "On deck in open", including deck areas over holds containing military explosives;

(ii) "Tween-deck" or "Under deck" in holds adjacent, any hold below or any hold above holds containing military explosives; or,

(iii) In the same hold containing Class I, IV, V, VII, X-A, X-B, X-C, or X-D, provided the stowage of military vehicles and the stowage of ammunition are separated by a division bulkhead or a 2-inch dunnage floor.

(5) Military vehicles and privately owned vehicles shipped by, for, or to the United States Department of Defense (crated or uncrated) containing an electrolyte storage battery shall not be stowed in the same hold over military explosives stowed therein. Such vehicles may be stowed in the same hold under or alongside of military explosives stowed therein: *Provided*, That all the applicable provisions of this section and § 146.29–61 are observed: *And provided further*, That the vehicles are processed, the fuel tank drained dry, the battery terminal leads disconnected, taped and protected against short circuit.

(6) Military vehicles or military equipment as used in this section includes naval vehicles or naval equipment.

(e) *Flammable compressed gases*. (1) Military explosives shall not be stowed in the same hold nor in any hold below, any hold above or a hold adjacent to one in which flammable compressed gases are stowed.

(2) Flammable compressed gases shall not be stowed "On deck" over a hold in which any Class II-A, II-C, II-D, II-E, II-G, V, VI, VII, VIII, IX-A, IX-B, IX-C, X-A, X-B, X-C, X-D, XI-A, XI-B, or XI-C is stowed.

(3) Flammable compressed gases may be stowed "On deck" over a hold in which Class I, II-B, II-F, II-J, III, or IV is stowed: *Provided*, That, the weather deck is tight and the cargo hatch is fitted with a tight raised coaming, and such stowage is accomplished by means of skids at least 6 inches in height off the deck or a crib and platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib. Other applicable provisions of 49 CFR part 176, shall be observed. Stowage may be over the square of the hatch.

(f) *Non-flammable compressed gases*. Ammunition of the following Classes I, II-B, II-G, IV, V, and VII may be stowed in the same hold or compartment with non-flammable compressed gases provided the two stowages are separated by a type "A" dunnage floor or a division bulkhead. This mixed stowage is not permitted for the following non-flammable gases: Boron trifluoride, chlorine, oxygen and sulphur dioxide.

(g) *Poisons*—(1) *Class "A".* Classes I and II-F ammunition may be stowed in the same hold or compartment with Class "A" poisons provided the two stowages are separated by a type "A" dunnage floor or a division bulkhead.

(2) *Class "B".* Ammunition of the following classes, I, II-B, II-F, IV, V, VII, XI-A, and XI-B may be stowed in the same hold or compartment with class "B" poisons: *Provided,* That the two stowages are separated by a type "A" dunnage floor or a division bulkhead.

(3) *Irritating materials.* Ammunition of the following classes I, II-B, II-F, II-G, IV, V, VII, XI-A, and XI-B may be stowed in the same hold or compartment with irritating materials: *Provided,* That the two stowages are separated by a type "A" dunnage floor or a division bulkhead. Class II-A, propellant charges, may also be stowed in the same hold with irritating materials: *Provided,* That the two stowages are separated by a type "A" dunnage floor or a division bulkhead: *And provided further,* That the Class II-A, propellant charges. ammunition is given top stowage.

(h) *Other regulated materials (ORM)*: Military explosives shall not be stowed in the same hold or in the hold below, the hold above or a hold adjacent to the one in which other regulated materials (ORM) are stowed.

(i) *Radioactive materials.* Military explosives may not be stowed in the same hold in which radioactive materials are stowed.

(j) *Combustible liquids.* (1) Military explosives shall not be stowed in the same hold nor in the hold below one in which combustible liquids are stowed.

(2) Combustible liquids may be stowed "On deck" over a hold in which military explosives are stowed: *Provided,* That the weather deck is tight and the cargo hatch is fitted with a tight raised coaming and such stowage is accomplished by means of a crib and a platform so constructed as to provide a free space of at least 6 inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur. *And provided further,* That such stowage is not made over the square of a hatch.

(k) *"On deck" stowage.* When packages of flammable liquids, flammable solids, oxidizing materials, or organic peroxides, corrosive materials, compressed gases, poisons, radioactive materials, combustible liquids, or other regulated materials (ORM) are stowed "On deck," such packages shall not be stowed within 12 inches of any steam pipe fitted on deck.

[CGFR 62-11, 27 FR 5287, June 5, 1962]

EDITORIAL NOTE: For FR citations affecting § 146.29-59 see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 146.29–61 Stowage with nondangerous cargo in the same hold.

(a) Military explosives that are stowed in the same hold with nondangerous cargo shall be protected from damage likely to be caused by heavy nondangerous cargo. Shafting, steel bar, steel shapes, pipe, heavy machinery, vehicles (uncrated), and similar types of cargo shall, when stowed in the same hold with military explosives, be so isolated or dunnaged or secured as to prevent damage to military explosives or magazines containing said substances, or temporary bulkheads protecting explosive stowages, under any conditions likely to be encountered during the voyage.

(b) When nondangerous cargo is to be stowed adjacent to the exterior of a magazine, wooden cargo battens of not less than commercial 2" x 4" size spaced not more than 12 inches, center to center, shall be fitted horizontally to the uprights forming the frame of the magazine.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8158, June 7, 1967]

§ 146.29–63 Stowage and dunnaging of ammunition and containers of explosives in bulk.

(a) Military explosives shall be so stowed and dunnaged as to prevent damage to the cargo or the vessel from shifting cargo caused by forces incident to the voyage of the vessel. Nothing within this paragraph shall be construed as requiring the entire interior of the cargo compartment to be covered with dunnage.

(b) Containers of military explosives marked, "This side up" or otherwise marked directing their stowage shall be so stowed.

(c) Kegs of black powder shall be stowed in an upright position, the bungs or other filling openings "up". Each tier shall be floored off.

(d) Metal containers or metal tanks or other containers of propellant charges having closure means which protrude beyond the chime or the surface of the container shall be so dunnaged as to prevent damage occurring to such closures.

(e) The uppermost tier of military explosives shall be so secured to the mutual satisfaction of the Captain of the Port and the Master of the vessel by tomming, bracing, strapping, top stowing with permissible cargo of sufficient unit weight and quantity or other effective means that no displacement can occur either upwardly or laterally.

(f) Military explosives shall be so stowed that they or the containers are not liable to be pierced by the dunnaging or crushed by superimposed weight.

(g) Containers of military explosives shall not be "cant" stowed. They shall be stowed in full bearing on dunnage or both end and center bearing on dunnage. Broken stowage may at the turn of the bilge, be dunnaged out with cordwood or otherwise so cribbed as to provide maximum bearing attainable for the container to be stowed in the tier above. Broken stowage in other locations in the hold may be compensated for by cribbing out or by the insertion of sufficient dunnage to provide proper bearing for packages in the tier above.

(h) Fixed or semifixed ammunition in fiber containers, crated or uncrated, may be stowed on its base or on its side. Dunnaging shall be accomplished in such manner as to bear only upon the metal part of the container. No dunnage or weight shall bear directly upon the fiber portion of the container.

(i) [Reserved]

(j) Separate-loading projectiles boxed, crated, unboxed, or uncrated may be stowed on their bases or on their sides except as otherwise provided for Avmy WP filled ammunition in the stowage requirements for Class II-D ammunition, § 146.29–100.

(k) When tween-deck holds of cargo vessels are utilized for the stowage of military explosives, the maximum permissible deck load for such tween decks shall not be in excess of 45 pounds per square foot of tween-deck space for each foot of tween-deck height, except where the deck and hatch structure of ships have been specially designed or reinforced for the carriage of heavy loads the Captain of the Port may permit loading in accordance with these schedules of increased intensity of loading when they are furnished by the master or operator.

§ 146.29–65 Damaged or leaking containers of explosives.

(a) Any container of explosives or chemical warfare agents showing evidence of failure, leaking of a liquid ingredient or inability to retain its contents shall not be accepted for transportation, storage, or stowage on board any vessel.

(b) Any container of an explosive when offered for transportation, storage, or stowage, showing excessive dampness or which is moldy or shows outward signs of any oil stain or other indications that absorption of the liquid part of the explosive is not perfect, or that the amount of the liquid part of the explosive is greater than the absorbent can carry, shall not be accepted for transportation. The shipper must substantiate any claim that a stain is due to accidental contact with grease, oil, or similar substances. In case of doubt the container shall be refused.

§ 146.29-67 Defective ammunition.

Ammunition found to be defective while being unloaded from a barge, freight car, or other vehicle, shall not be placed on board a vessel. If found to be defective while on board the vessel, it shall, if at all possible, be removed from the vessel to an isolated location as quickly as possible.

§ 146.29-69 Recoopering damaged packages.

Defective packages shall not be recoopered in the hold of a vessel. Such packages shall not be recoopered elsewhere on board the vessel except upon conditions authorized by the Captain of the Port. Replacing bomb shipping bands, loose covers, nose plugs or strapping containers is not classed as recoopering.

§ 146.29-71 Constructing magazines.

(a) All work in connection with the construction of a magazine, or other conditioning of holds, decks, or hatches shall be completed before the actual loading of military explosives is undertaken except as provided in §§ 146.29-35(e) and 146.29-81(b). Magazine construction or other conditioning of a hold in which military explosives are not actually being loaded or which do not contain any military explosives is permitted.

(b) Sizes of material used for the construction of a magazine or other conditioning of holds, decks, or hatches, as set forth in the regulations in this subpart, are minimum. Increased sizes may be used, if desired. Nails shall not protrude beyond the surface of the lumber or other material authorized.

§ 146.29-73 Preparation of magazines, decks, hatches and holds for handling military explosives.

(a) All magazines and holds shall be cleared of all rubbish and discarded dunnage and be swept, hosed down or cleaned by such other efficient method that will insure the compartment to be broom clean and free of any residue from cargo before commencing to load any military explosives. Bilges, overhead deckbeams and strongbacks shall be examined and any residue of previous cargo removed therefrom.

(b) All decks, gangways, and hatches over or through which military explosives must be passed or handled in loading or unloading shall be freed of all loose material and shall be swept broom clean both before and after loading or unloading.

(c) The hatches or cargo ports opening into a compartment in which military explosives are stowed shall be kept closed at all times except during the operation of loading or unloading of the compartments or during periods of short duration for such as lunch-breaks and railcar and truck switching or between shifts on a two- or three-shift daily operation. During the period of such stoppages the hold shall be protected as prescribed by the Captain of the Port. Hatches covered with wooden covers shall be securely closed with tarpaulins.

(d) No debris of any description which creates a fire hazard or a hazardous condition for persons engaged in the explosives handling operation shall be permitted to stand on the weather deck of a vessel while military explosives are being worked.

(e)(1) Hatch beams and hatch covers shall, where possible, be stowed on the opposite side of the hatch from that over which the military explosives are being worked. If this is impossible, they may be stowed on the working side of the hatch.

(2) Hatch beams shall be stowed or secured in a manner that will prevent them from rolling, rocking, turning or sliding.

(3) Hatch covers shall be so stowed as to form as level a platform as possible.

(f) During the time a hatch is open and military explosives are being worked or stowed, the vessel's officer on duty supervising the handling of explosives shall warn the masters of other vessels coming alongside and the operator of any dock equipment (capable of producing sparks) to stay clear of the area adjacent to open hatches as far as practicable.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8158, June

7, 1967; CGFR 69-72, 34 FR 17494, Oct. 29, 1969]

§ 146.29-75 Location of magazines and ammunition stowage.

(a) A cool location being an important factor, magazines shall be built and military explosives stowed in an authorized location in accordance with the following factors in the order listed. The Captain of the Port may authorize in his discretion a modification of the below established location priorities when circumstances so justify:

(1) A tween-deck hold, preferably a lower tween-deck.

(2) A lower hold.

(3) In the square of a hatch.

(4) A shelter deck in a location as far removed from uptakes or engine casing as possible.

(5) A forecastle, poop or permanent deck house provided the space is ventilated and does not contain any "In use" crew accommodations, nor vessel stores, and can be closed off from traffic while at sea.

(6) "On deck" stowage.

(7) Insulated spaces normally comprising refrigerator spaces may be used for the stowage of all classes of military explosives, except Class II-J chemical ammunition: *Provided*, That all regulations relative to stowage of explosives with other dangerous articles of cargo are observed and the spaces may be ventilated sufficiently to provide a temperature consistent with the temperature of other holds of the vessel. When such spaces are fully ceiled, the entire compartment will be considered as a magazine, however, any pipes within the compartment shall be protected by horizontal cargo battens of a size not less than commercial 2" x 4", spaced not more than 12 inches apart, center to center and secured to 4" x 6" uprights spaced not more than 36 inches apart. Refrigerator spaces, the floors of which are lined with lead, shall not be used as a stowage for picric acid in bulk or ammonium picrate.

(b) When it is necessary to construct a magazine or to stow ammunition adjacent to the engine room, boiler room or coal bunker bulkheads, or the engine or boiler room uptakes or casings, the following provisions shall be complied with except in the stowage of small arms ammunition without explosive bullets:

(1) A tight wooden temporary bulkhead shall be constructed at least one foot off the permanent bulkheads, uptakes or casings with the smooth side facing the stowage of the explosives or ammunition.

(2) When the permanent bulkhead is smooth on the cargo side, construction shall be of commercial 2-inch boarding secured to uprights of 4" x 6" size spaced not more than 30 inches apart in the 'tween or shelter deck, or 6" x 6" size spaced not more than 24 inches apart in the lower hold. Uprights shall not be stepped directly onto a metal deck or overhead. A 2" x 6" bearer to carry the upright shall be laid on the metal deck, and a 2" x 6" header shall be fitted against the underside of the overhead deck to receive the top of uprights. Top of uprights fitted against overhead deck beams may be wedged direct to the beam with 2" x 4" spacers fitted between. Suitable horizontal stringers shall be fitted between temporary and permanent bulkhead at the top and bottom, as well as intermediate stringers spaced a maximum of 5 feet. Uprights shall be securely fastened to horizontal stringers or horizontally braced at the top, bottom and center.

(3) When the permanent bulkhead stiffeners are on the cargo side, suitable uprights of not less than 2" x 4" may be installed against the permanent vertical stiffeners to give the required 12 inches off the bulkhead. If the permanent stiffeners are over 30 inches apart, center to center, 2½-inch boarding shall be used. Uprights shall be stepped and braced as required by the provisions of paragraph (b)(2) of this section. Bulkhead stiffeners that do not extend the full depth of the cargo space shall not be used for this purpose.

(4) Other methods of construction using steel or wooden uprights, bolted to plates or lugs welded to deck beams, decks, or tank tops may be used provided the strength is equivalent to that obtained by the foregoing methods of construction.

(c) Stowage provided for military explosives shall be dry and except for deep tanks well ventilated.

(d) Ammunition as cargo shall not be stowed within a distance of 10 feet of a vessel's radio shack, receiving or transmitting apparatus, radio antenna or antenna lead-in. The same restriction applies to radar equipment.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8159, June 7, 1967]

§ 146.29-77 Allocation of stowage.

Military explosives that are tendered to a vessel for transportation as cargo shall be stowed on board the vessel utilizing the type of stowage authorized for the particular ammunition or explosives in bulk by the provisions of § 146.29-100.

§ 146.29-79 Types of stowage.

The types of stowage prescribed for military explosives are described as follows:

(a) Magazine stowage A.
(b) Ammunition stowage.
(c) Chemical ammunition stowage.
(d) Special stowage.
(e) Portable magazine stowage.
(f) Pyrotechnic stowage.
(g) Stowage of blasting caps, detonators, primer detonators, etc.
(h) Deck box and van.

§ 146.29-81 Magazine stowage A.

The following shall be observed in the construction of a magazine required by the table in § 146.29-100 for "Magazine A" type of stowage:

(a) Magazines may be constructed of steel or wood.

(b) Magazines constructed of steel shall have the whole of the interior thoroughly protected by wood dunnage of a minimum thickness of ¾ inch. This lining may be installed during the progress of the stowage. Metal stanchions within the magazine shall be boxed with wood of a thickness of not less than ¾ inch. Boxing of portable non-ferrous dunnage system stanchions is not required. Bulkhead stiffeners or other structural members extending into the stowage spaces shall not be protected by dunnaging but shall be completely boarded over. When bare steel decks or tank tops are utilized to form the floor of a magazine, a wooden floor consisting of at least two layers of commercial 1-inch thick dunnaging shall be laid, the top course being laid crosswise to the lower course. When steel decks or tank tops are originally fitted with a wood flooring or are ceiled, it shall be necessary to fit one course of dunnage. All flooring formed by these methods shall be laid with commercial 1-inch lumber of widths not less than 4 inches, fitted as close as possible, edge to edge and butt to butt.

(c) Magazines constructed of wood shall have the bulkheads forming the sides and ends constructed of commercial 1-inch lumber, of ¾-inch tongue and groove sheathing, or of ¾-inch plywood, secured to uprights of at least a 3″ x 4″ size, spaced not more than 18 inches apart and secured at top, bottom and center with horizontal bracing. When ¾-inch plywood is used, the uprights may be spaced on 24-inch centers. Uprights shall not be stepped directly onto a metal deck. A 2″ x 4″ bearer to carry the uprights shall be laid upon the metal deck. A 2″ x 4″ header shall be fitted against the underside of an overhead deck to receive the top of uprights. Top of uprights fitted against channel beams may be wedged directly to the beam with 2″ by 4″ spacers fitted between. Care shall be taken in securing upright framing that no nails penetrate to the interior of the magazine. When a magazine is constructed as a permanent compartment in the vessel, increased size and finish of lumber and other methods of fastening may be used provided such fastenings are recessed below the surface of the boarding to avoid projections within the interior of the magazine. All boardings shall be fitted and finished so as to form a smooth surface within the interior of the magazine. Construction shall be such as to separate all containers of explosives from contact with metal surfaces of the structure of the vessel. When a metal stanchion, post or other obstruction is located within the interior area of the magazine, such obstruction must be completely covered with wood of a thickness of at least ¾ inch secured in place with nails or screws. When screws are used for fastening, the screwheads shall be countersunk below the surface of the wood. The floor of the magazine shall conform to the provisions of paragraph (b) of this section. The door of the magazine shall be of substantial construction, fitted reasonably tight into its jamb. The door may be secured in place by the use of extension battens and wedges.

(d) A magazine constructed in accordance with the provisions of paragraphs (b) and (c) of this section, in which it is proposed to stow containers of explosives within 12 inches of the overdeck beams, or hatch coaming, shall have such deck beams and coaming sheathed with wood similar to that required for metal stanchions, posts or other obstructions by the provisions of paragraph (c) of this section.

(e) When a Class A magazine measures more than 40 feet in any direction, a partition bulkhead shall be fitted within the magazine as near half length as practicable, extending from the deck to at least the top of the stowage. Such partition bulkhead shall be constructed to the same scantlings as the sides of the magazine, except the boardings may be spaced not more than 6 inches apart alternately on both sides of the uprights. This bulkhead shall be constructed before loading commences and care shall be exercised that nail points do not protrude beyond the surface of the boarding. Such partition bulkheads are not required in magazines using the U.S. Navy nonferrous metal dunnage system.

(f) A magazine constructed in accordance with the provisions of paragraphs (b) and (c) of this section shall comply with the provisions of § 146.29–75(c).

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8159, June 7, 1967]

§ 146.29–83 Ammunition stowage.

Military explosives that are authorized to be given ammunition stowage by the provisions of § 146.29–100 shall be stowed in a location selected in accordance with the provisions of § 146.29–75. Dunnage shall be laid over metal decks or tank tops, except that dunnage is not required when decks or tank tops are coated with mastic, magnesite, or other equivalent material, and when palletized units are used and the pallets are constructed of wood. Dunnaging shall be fitted to protect packages or articles or military explosives from damage. Nothing within this paragraph shall be construed as requiring the entire interior of the cargo compartment to be covered with dunnage.

§ 146.29–85 Chemical ammunition stowage.

Chemical ammunition or chemical agents in bulk that are authorized to be given chemical ammunition stowage by the provisions of § 146.29–100 shall, unless given another authorized stowage, be stowed under the following conditions:

(a) Shall be afforded the same protection as required for ammunition stowage.

(b) Stowage shall preferably be in a deep tank or a lower hold.

(c) When stowed in a deep tank, pump suctions shall be effectively sealed off to prevent the escape of any leakage which may take place. Sealing off shall be accomplished by inserting a blank flange in way of the suction side of the bilge pump manifold.

NOTE: The blank flange is to prevent inadvertent leaking of chemical agents into occupied spaces through bilge suction piping. Nothing herein shall preclude the removal of the flange in an emergency situation should (in the opinion of the vessel's master) pumping of the deep tank be necessary.

(d) When stowed in a lower hold or other compartment, the hatch covers, ventilators and pump's suction shall be effectively sealed off to prevent the escape of any leakage which may take place. Sealing off the pump's suction shall be accomplished by inserting a blank flange in way of the suction side of the bilge pump manifold.

(e) When the quantity of chemical ammunition or chemical agents in bulk exceeds the capacity of deep tanks and lower holds, other holds may be used, preference being given to other lower holds or to a tween-deck hold directly over a lower hold in which such substances are stowed.

(f) Chemical ammunition or containers of chemical agents in bulk stowed in a tween-deck shall not be stowed within 8 feet of the side of the vessel.

(g) When the quantity of chemical ammunition to be stowed on board the vessel does not justify the use of a deep tank or lower hold, a suitable tween-deck space may be selected and the ammunition stowed in a portable magazine especially constructed to prevent any leakage from the ammunition escaping outside of the magazine. Such portable magazine shall be located at least 8 feet from the ship's side.

(h) Before entering a deep tank, lower hold or other compartment containing chemical ammunition the air inside the compartment must be tested by competent personnel to ascertain if leakage has taken place. If leakage has occurred, the operation of removing the ammunition or chemical agent shall be conducted by skilled personnel, preferably representatives of the appropriate Department of Defense technical service.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8159, June 7, 1967; CGFR 69-72, 34 FR 17494, Oct. 29, 1969]

§ 146.29-87 Special stowage.

Special stowage may be on deck protected from the elements, in a deck house, mast house, mast locker or in a vacant stateroom: *Provided,* That such a location conforms to the distance separation rule applicable to the item so stowed and adjacent military ammunition: *And provided further,* That the space is ventilated and does not contain any vessel stores or machinery or equipment used during the navigation of the vessel and can be closed off from traffic while at sea. Dunnage shall be fitted to protect packages from damage by contacting any metal parts of the ship.

§ 146.29-89 Portable magazine stowage.

Military explosives authorized to be given portable magazine stowage by the provisions of § 146.29-100 shall be stowed under the following conditions:

(a) Shall be located in a hold or on deck in accordance with the provisions of § 146.29-99 and § 146.29-100 for the particular class of military explosive stowed therein. "On deck" stowage shall also meet the requirements of § 146.29-57.

(b) Portable magazines shall be constructed of wood, or of metal lined with wood ¾-inch minimum thickness, and not more than 100 cubic feet plus 10 percent of explosives (gross) shall be stowed therein.

(c) All inner surfaces of the magazine shall be smooth and free of nails, screws, or other projections.

(d) When constructed of wood the scantlings shall not be less than those required for a type "A" magazine in § 146.29-79, and a strong, close fitting hinged cover or door with an effective means of securing shall be provided.

(e) When constructed of metal, the minimum thickness of the metal shall be not less than ⅛-inch sheet, or formed material.

(f) Ammunition or containers of ammunition or explosives in bulk when stowed in a portable magazine shall be so stowed and secured that no displacement can occur either upwardly or laterally.

(g) When stowed on deck the magazine shall be protected from the direct rays of the sun and elements. Runners, bearers, skids, or other suitable means shall be provided to elevate it a minimum of 4 inches from the deck. Pad eyes, ring bolts, or other suitable means shall be provided for lashing the magazines and they shall be so lashed, chocked or braced as to prevent movement in any direction.

(h) Portable magazines shall carry the legend "Inflammable—Keep Lights and Fire Away," or "Flammable—Keep Lights and Fire Away." When used in lieu of ammunition stowage, the legend shall indicate the Coast Guard class or classes of military explosives stowed therein.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 63-19, 28 FR 5385, May 30, 1963]

§ 146.29-90 Use of cargo transporters (Conex Boxes).

Cargo transporters, complying with Military Specifications MIL-B-11886 and MIL-B-21560, may be used for the transportation of military explosives and hazardous munitions subject to the following conditions:

(a) Type I or Type II transporters may be used.

(b) The load content shall not exceed 7800 pounds, equally distributed.

(c) Prior to filling, each transporter is required to be thoroughly inspected by an authorized representative of the shipping activity. Special attention shall be given to the inspection of the corner posts, floor system, the lower eight inches of the side and end panels, doors, and door latches. A record of this inspection shall be maintained by the shipping installation for a period of one year after the shipment leaves the installation or activity.

(d) Lifting shall be accomplished in a manner which will support the floor system. When slings or wire ropes are used, they shall be placed under the container to support the floor system.

(e) The cargo handling gear must be of a design capable of handling a working load at least 50 percent greater than the actual weight of the unit comprising the draft.

(f) The master, owner, charterer, agent or other person in charge of the vessel shall require the shipper or his agent, or the delivering carrier to furnish a copy of the shipper's shipping order, shipping paper, bill of lading, manifest or other memorandum, or a waybill prepared from information furnished in the shipper's shipping order bearing the required certification before accepting cargo transporters containing military explosives or hazardous munitions. This shipping paper shall have entered upon it the proper and definite name and class of the commodity or commodities contained therein according to § 146.29-100, the total quality by weight; the label applied, if required; and the identification number of the transporter.

(g) Cargo transporters shall carry the legend "Explosives—Keep Lights and Fire Away", or if hazardous munitions are being shipped "Hazardous Munitions—Keep Lights and Fire Away" as well as the Coast Guard class or classes of military explosives or hazardous munitions stowed therein, e.g., "Coast Guard Class II-H." Letters shall be at least three inches high in contrasting color with the background.

(h) The master or other person in charge of the vessel shall assign an officer of the vessel to supervise the acceptance and stowage of the transporters containing military explosives or hazardous munitions. This officer shall examine the transporters for signs of leaking, damage to the containers, or sifting of contents. Any transporter found to be damaged, leaking or sifting shall not be accepted for transportation.

(i) Cargo transporters containing any military explosives or hazardous munitions may be opened by a duly authorized representative of the Coast Guard for inspection to determine compliance with the regulations applicable to such shipments.

[CGFR 67-23, 32 FR 8159, June 7, 1967, as amended by CGFR 68-66, 33 FR 8452, June 7, 1968; CGFR 68-142, 34 FR 2102 Feb. 12, 1969; Amdt. 176-1, 41 FR 28122, July 8, 1976]

§ 146.29-91 Pyrotechnic stowage.

(a) Pyrotechnic ammunition shall be afforded ammunition stowage or special stowage in a location away from heat and so protected as to insure no moisture contacting the packages. This class of ammunition shall not be stowed in a hold or compartment with any other military explosives, except as permitted by the admixture chart (§ 146.29-99) Pyrotechnics shall not be overstowed with other cargo.

(b) For limited quantities of pyrotechnic ammunition an alternate stowage may be utilized consisting of stowing in metal lockers or portable magazines so located as to conform with the provisions of paragraph (a) of this section as regards other explosives, overstowage, heat, and moisture.

§ 146.29-93 Stowage of blasting caps, detonators, primer detonators, etc.

Stowage of Classes III, VI and VIII type ammunition shall conform to the provisions of §§ 146.29-99 and 146.29-100, and to the following requirements:

(a) Class VIII ammunition, when stowed on board the same vessel with

Classes II, IV, V, or VII military explosives, shall be separated as follows:

(1) With a permanent steel deck or bulkhead intervening, the separation shall not be less than 10 feet in any direction except where there exist additional intervening permanent steel decks or bulkheads in which case the distance requirement may be reduced by 50 percent.

(2) Without a permanent steel deck or bulkhead intervening, the separation shall not be less than 25 feet in any direction.

(b) Class VIII ammunition, when stowed on board the same vessel with Classes IX, X, or XI military explosives, shall be separated as follows:

(1) With a permanent steel deck or bulkhead intervening, the separation shall not be less than 25 feet in any direction except where there are existing additional intervening permanent steel decks or bulkheads, in which case the distance requirement may be reduced by 50 percent.

(2) Without a permanent steel deck or bulkhead intervening, the separation shall be not less than 40 feet in any direction.

(c) Class VIII ammunition shall not be stowed within 8 feet of the vessel's side, except blasting caps stowed in a portable magazine "On deck" need not meet this requirement.

(d) When Class VIII ammunition is stowed over tween-deck hatch covers, and military explosives are stowed in a hold below, a single layer of commercial 2-inch lumber is required over the tween-deck hatch cover to form the floor of the magazine. Under these conditions, wooden hatch covers may be considered an integral part of the permanent steel deck and the separation requirements of paragraphs (a)(1) and (b)(1) of this section shall apply.

(e) When Class III or VI ammunition is stowed with Class VIII ammunition the provisions governing the stowage and separations of Class VIII shall apply.

(f) When a portable magazine is used for detonator stowage, such magazine may be stowed in the square of a weather deck hatch.

(g) Upon approval by the Captain of the Port, a portable magazine containing Class VIII ammunition may be stowed in an isolated cabin or steel deck house secure from aircraft machine-gun fire and not subject to casual contact by persons on board the vessel.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8159, June 7, 1967; CGFR 69-72, 34 FR 17494, Oct. 29, 1969]

§ 146.29-95 Ventilation of magazine.

A magazine that is not fitted with ventilating ducts to the atmosphere shall be ventilated by omitting the top course of boarding on the sides of the magazine to provide a clear space at least 1 inch and not more than 6 inches below the lower flange or toe of the deck beam within the compartment or hold in which the magazine is constructed. Ventilators of systems feeding directly into a magazine or a hold in which military explosives are stowed shall be covered with a layer of wire screen of not less than ⅛-inch mesh at the weather end of the cowl. This screen shall be attached securely in place in such a manner as to insure a positive closure.

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 69-72, 34 FR 17494, Oct. 29, 1969]

§ 146.29-97 Statements of characteristic properties and hazards.

(a) In § 146.29-100 there are statements in italics setting forth certain characteristics and hazards of the substances or articles listed therein. It is not intended, nor shall it be assumed that these statements set forth all of the characteristic properties or hazards of the particular substance or article and such statements as are shown are informative only.

(b) For the purpose of the regulations in this subpart Army Class XII explosives are treated as follows:

(1) Ammonium nitrate is classified as an oxidizing material.

(2) Wet nitrocellulose wet with 20 percent of water is classified as a flammable solid.

(3) Wet nitrocellulose wet with 30 percent of alcohol or flammable solvent is classified as a flammable liquid.

[CGFR 64-20, 29 FR 6797, May 23, 1964]

§ 146.29–99 Explosives admixture charts.

(a) Chart A of this section indicates the compatibility of the various classes of ammunition described in § 146.29–100. Chart B of this section indicates the compatibility within the class of items of Classes XI–C and XI–D.

(b) A shaded block at an intersection of horizontal and vertical columns in Chart A indicates that the particular class of military explosives shown by the heading of the horizontal column to the left must NOT be stowed in the same hold or compartment with the particular class of military explosives indicated by the heading of the vertical column at the top of the chart. A shaded block at the intersection of horizontal and vertical columns in Chart B indicates that the particular item shown by the heading of the horizontal column to the left must NOT be stowed "On deck" together unless separated by the superstructure, or in the same hold or compartment with the item indicated by the heading of the vertical column at the top of the chart. For specific provisions of stowage, and items included in each class, refer to § 146.29–100.

(c) In the charts the letters refer to the following notes:

Note A: Class II–F may be stowed in the same lower hold or tween-deck hold with Classes II–C, II–E, II–G, and III provided the Class II–F ammunition is bottom stowed and provided further that no other class of explosive or ammunition is stowed in the hold or tank below.

Note B: Class II–F may be stowed in the same deep tank, lower hold or tween-deck hold with Classes II–B, IV, V, VII: *Provided*, That the Class II–F ammunition is bottom stowed: *And provided further*, That no other class of explosives or ammunition is stowed in the hold or tank below.

Note C: Propellant charges Class II–A for separate loading artillery projectile filled with Class XI–A or XI–B chemical may be stowed together in the same hold or compartment: *Provided*, That the propellant charges are "top stowed," the two items being separated by a type "A" dunnage floor. When so stowed the propellant charges shall not be overstowed with any other cargo.

Note D: Class II–J TH incendiary filled ammunition shall be stowed only in a deep tank or lower hold, and in all cases, bottom stowed, except that a limited quantity shipment not in excess of 500 lbs. net TH content may be stowed on deck in a special magazine constructed of material as set forth in § 146.29–81(c) and provided such magazine has an insulation of sand at least 1 foot thick on the bottom. This magazine shall be so mounted that there is at least 1 foot void between its bottom and the deck on which it is mounted, and its preferred location is aft. There shall be one charged fire hose in the immediate vicinity of this magazine when this class ammunition is stowed therein. There shall be only one such stowage per vessel and that stowage shall not be over living quarters or hatches in which military explosives, other dangerous articles or ship's stores are stowed below.

Note E: Class I, V (unfuzed and no fuzes packed in container), VII (unfuzed and no fuzes packed in container), and IX–B may be stowed with Class X–A if the two classes are separated by a partition bulkhead or type "A" dunnage floor.

Note F: See Chart B for compatibility of items within this class.

Note G: May be stowed together if separate stowage is not available.

Note H: May be stowed together if the two classes are separated by a partition bulkhead on a type "A" dunnage floor.

Note I: [Reserved]

Note J: Classes III and VI may not be overstowed with any other type of cargo or ammunition except classes III, VI and VIII. Class VIII may not be overstowed with any other type of cargo.

Editorial Note K: Class IX–C must be stowed in a separate magazine if stowed in the same hold with Class I.

CHART A—COMPATIBILITY CHART FOR VARIOUS CLASSES OF MILITARY EXPLOSIVES AND HAZARDOUS MUNITIONS

Legend: *Refers to different DOT classes: F.L., F.G., Cor. L., Oxy. M., etc.
A, B, C, D, E, F, G, H, J, and K—Check notes in § 146.29–99 for proper stowage
⊖ Shall NOT be stowed together
□ May be stowed together

DOT class		Class	I	II-A	II-B	II-C	II-D	II-E	II-F	II-G	II-H	II-J	III	IV	V	VI	VII	VIII	IX-A	IX-B	IX-C	X-A	X-B	X-C	X-D	X-E	XI-A	XI-B	XI-C	XI-D	Class
C	Small-arms ammunition w/o explosive bullets, mechanical time fuze and like items	I	□	H	□	□	□	□	□	□	⊖	D	J	□	□	J	□	J	H	H	K	E	H	⊖	⊖	⊖	□	□	⊖	⊖	I
B	Bulk propellants, such as ballistite, cordite, FNH, NH, and NC powder, "Made-up bag charges" in outside shipping containers	II-A	H	□	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	⊖	□	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	C	C	⊖	⊖	II-A
B	Fixed ammunition w/o explosive projectiles and like items	II-B	□	□	□	□	⊖	□	B	⊖	⊖	D	J	□	□	J	□	⊖	□	⊖	⊖	⊖	⊖	H	⊖	⊖	⊖	□	⊖	⊖	II-B
B or C	Pyrotechnics (fireworks)	II-C	□	⊖	□	□	⊖	□	A	⊖	⊖	D	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	II-C
*Var.	Chemical ammunition—WP or PWP filled (solid)	II-D	□	⊖	⊖	⊖	□	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	II-D
*Var.	Chemical ammunition—HC filled (solid)	II-E	□	⊖	□	□	□	□	A	□	⊖	⊖	J	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	II-E
*Var.	Chemical ammunition—FS or FM filled smoke (liquid)	II-F	□	⊖	B	A	⊖	A	□	A	⊖	⊖	A	B	B	⊖	B	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	II-F
*Var.	Chemical ammunition—IM, NP, or PT filled, incendiary composition (oil gel)	II-G	□	⊖	⊖	⊖	⊖	□	A	□	⊖	D	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	⊖	⊖	II-G
None	Chemical ammunition—water activated	II-H	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	⊖	⊖	II-H
*Var.	Chemical ammunition—TH filled incendiary composition (solid)	II-J	D	⊖	D	D	⊖	⊖	⊖	D	⊖	□	⊖	D	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	II-J
B or C	Fuzes, PD w/o booster; fuzes AT mine (nonchemical) w/o booster; fuzes, bomb tail w/o booster; fuzes, tracer; primers; primer detonators, etc	III	J	⊖	J	⊖	⊖	J	A	⊖	⊖	⊖	□	J	J	□	⊖	J	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	III
A	Fixed and semifixed ammunition with explosive loaded projectile	IV	□	□	□	⊖	⊖	⊖	B	⊖	⊖	D	J	□	□	J	□	⊖	⊖	⊖	⊖	⊖	⊖	H	⊖	⊖	⊖	□	⊖	⊖	IV
A	Separate loading projectiles filled with explosive "D"	V	□	□	□	⊖	⊖	⊖	B	⊖	⊖	⊖	J	□	□	J	□	⊖	⊖	⊖	⊖	E	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	V
A	BD fuzes; PD fuzes with booster; bomb fuzes with booster, rocket fuzes with booster; and like items	VI	J	⊖	J	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	J	J	□	⊖	J	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	VI
A	Separate loading proj. filled with HE other than explosive "D"	VII	□	□	□	⊖	⊖	⊖	B	⊖	⊖	⊖	⊖	□	□	⊖	□	⊖	⊖	⊖	⊖	F	⊖	H	⊖	⊖	⊖	□	⊖	⊖	VII
A or C	Blasting caps; detonators; AT mine fuzes (chemical); etc	VIII	J	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	J	⊖	⊖	J	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	VIII
A or B	Explosives in bulk, such as black powder, propellant explosives for small arms, etc	IX-A	H	□	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	IX-A
A	High explosives, such as dynamite, TNT, demolition blocks, etc	IX-B	H	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	E	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	IX-A
A	Initiating and priming explosives in bulk	IX-C	K	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	IX-C
A	Explosive bombs, mines, torpedoes, etc	X-A	E	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	E	⊖	E	⊖	⊖	E	⊖	□	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	X-A
A	Explosive bombs, mines, etc. packed with fuze in integral package	X-B	H	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	X-B
A	Guided missiles with solid propellant motors, w, w/o HE warhead	X-C	⊖	⊖	H	⊖	⊖	⊖	⊖	⊖	⊖	⊖	H	⊖	⊖	H	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	X-C
A	Guided missiles with liquid petroleum fueled propellant motors, HE warhead	X-D	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	X-D
B	Rocket engines liquid	X-E	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	⊖	⊖	⊖	⊖	⊖	X-E
A or Pois. A	Chemical ammunition—lethal	XI-A	□	C	⊖	⊖	⊖	⊖	□	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	⊖	⊖	⊖	XI-A
A or Irritating mtls.	Chemical ammunition—nonlethal	XI-B	□	C	□	⊖	⊖	⊖	□	□	⊖	⊖	⊖	□	□	⊖	□	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	□	□	⊖	⊖	XI-B
*Var.	Fuels in containers for missile and rocket engines	XI-C	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	F	⊖	XI-C
*Var.	Oxidizers in containers for missile and rocket engines	XI-D	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	F	XI-D

CHART B—COMPATIBILITY CHART FOR VARIOUS ITEMS WITHIN CLASS XI-C AND CLASS XI-D

Legend: ⊖⊖ Shall NOT be stowed together ◫ May be stowed together G Check note for proper stowage

	Nomenclature	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
a	Acids; i. e., nitric sulfuric; fuming red nitric; fuming white nitric; etc.	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	a
b	Liquid hydrogen	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	b
c	Liquid fluorine	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	c
d	Liquid oxygen	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	d
e	Liquid nitrogen tetroxide.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	e
f	Anhydrous ammonia.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	f
g	Diborane; pentaborane.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	g
h	Aluminum borohydrides.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	h
i	Diethylene glycol dinitrate, liquid.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	i
j	Nitroglycerine, liquid	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	j
k	Hydrogen peroxide	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	k
l	Hydrazine; hydrazine hydrate.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	l
m	Dimethyl hydrazine, unsymmetrical.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	G	G	G	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	m
n	Alcohol-ethyl, methyl, furfuryl.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	G	◫	G	G	G	⊖⊖	G	G	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	n
o	Gasoline (AVGAS)	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	G	◫	◫	G	G	G	⊖⊖	G	G	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	o
p	Heptane; kerosene; octane.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	◫	◫	◫	G	G	G	⊖⊖	G	G	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	p
q	Pentane	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	G	G	G	◫	◫	◫	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	q
r	Aniline	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	G	G	◫	◫	◫	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	r
s	Monoethylaniline	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	G	G	◫	◫	◫	⊖⊖	◫	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	s
t	Nitromethane, tetranitromethane.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	t
u	Diethylene triamine	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	G	G	◫	◫	◫	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	u
v	Acetonitrile (methyl cyanide).	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	G	G	G	◫	◫	◫	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	v
w	Potassium cuprocyanide	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	⊖⊖	⊖⊖	⊖⊖	w

x	Sodium permanganate, solid.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	x
y	Calcium permanganate, solid.	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖○	⊖⊖	⊖⊖	◫	◫	⊖⊖	⊖⊖	y
z	Lithium, metallic	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	⊖⊖	z
aa	Metals, powdered	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	⊖⊖	◫	aa

[CGFR 62-11, 27 FR 5287, June 5, 1962, as amended by CGFR 67-23, 32 FR 8159, June 7, 1967; CGFR 70-143, 35 FR 19960, Dec. 30, 1970; 36 FR 5606, Mar. 25, 1971; Amdt. 176-1, 41 FR 28122, July 8, 1976]

§ 146.29–100 Classification, handling and stowage chart.

CLASSIFICATION, HANDLING AND STOWAGE CHART

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
I Small-arms ammunition w/o explosive bullets, detonating fuzes, DOT Class C, mechanical time fuze and like items.	Small-arms ammunition is a variety of fixed ammunition and includes blank ammunition and shotgun shells designed to be fired from a pistol, revolver, rifle, shotgun, or similar weapon held by the hand, or by the hand and shoulder, or machine guns of caliber less than 0.75 in. (19.05mm), or blank remover cartridges for pilot seat ejectors and canopy removing catapults, and consists of a metallic, plastic composition or paper cartridge case, a primer and a propelling charge, with or without bullet, shot, tear-gas material, tracer components or incendiary compositions or mixtures, but not including bullets loaded with high explosives. (For small arms ammunition with explosive bullets or projectiles see Class IV.) Other items of ammunition or component parts of ammunition having similar hazard characteristics to small-arms ammunition are also included in this class. Includes but is not limited to: Cartridges (small-arms type, less than 0.75 inch or 19.05mm): Aircraft engine starter. Armor piercing. Armor piercing incendiary. Armor piercing incendiary tracer. Ball. Blank. Carbine. Catapult, aircraft ejection seat. Exactor. High pressure test. Ignition. Impulse charges, DOT Class C. Incendiary	"Cannon primers." "Combination primers." "Cordeau detonant." "Empty cartridge case, primed." "Explosive cable cutters." "Explosive rivets." "Fuse lighters." "Grenades, empty, primed." "Igniter." "Percussion caps." "Percussion fuze." "Safety fuse." "Small-arms ammunition." "Small-arms ammunition, tear gas cartridge." "Small-arms primers." "Time fuze (mechanical w/o booster)."	C C C C C C C C C C C C C C C C	The principal hazard in connection with the stowage of this class of ammunition is its involvement in fire from outside source. Under such conditions the presence of this type of ammunition will not contribute excessively to the fire. Fire may be controlled and extinguished by flooding or spraying with large amounts of water. Missiles from burning ammunition will not be projected with any considerable velocity. Fire fighting personnel should take normal precautions and not expose themselves unnecessarily.	Any compartment or hold. May be stowed in any hold above, any hold below, or a hold adjacent to one in which flammable liquids, flammable solids or oxidizing materials, flammable compressed gases, hazardous articles or combustible liquids are stowed. Provisions of § 146.29–59 (Stowage adjacent to other dangerous articles) shall be complied with unless specifically exempted by the above paragraph. May be overstowed. May be transported in vans stowed on deck. Small arms ammunition w/o explosive bullets may be stowed adjacent to heat bulkheads without the additional requirements, stipulated by § 146.29–75(c).	1. Observe marking on package to be certain that no small-arms ammunition with explosive bullets is included. 2. Do not subject packages to rough handling. 3. Maximum weight per draft shall not exceed 3,000 lbs. plus 10%. 4. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs plus 10%. 5. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 6. The limiting weights noted above are for a 5-ton boom. See § 145.29–41.

Initiator. Powder actuated tool, shipped separately. Remover, aircraft canopy. Rifle grenade. Slick marker (MK1). Tear gas. Thruster. Tracer. Cartridge 20mm HPT, LPT, BL&T, TP, BL&P. Catapult w/cartridge: Aircraft ejection seat. Chemical delay pencil. Detonating cord. Detonating fuzes, DOT Class C. Empty cartridge case, primed. Firing device w/o detonator Fuse, blasting cap. Grenade projection adapter and similar inert devices when packed with blank small-arms cartridge. Grenades, empty primed. Igniter, torpedo. Mechanical time fuze. Miniature practice bomb signal. Powder actuated tool w/cartridge packed in the same outside box Primer, lock combination. Primer, lock electric. Primer, small-arms. Primers, percussion cap (such as used in small-arms ammunition). Remover w/cartridge, aircraft canopy, M1. Shell, shotgun. Small-arms ammunition w/o explosive bullets. T cutter (MK2).	When Class II–A, IX–A, IX–B, X–A, or X–B ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Class III, VI, and VIII ammunition may not be overstowed with this class. See § 146.29–99(c), Note D for stowage with Class II–J.

NOTE: The U.S. Army and Navy definitions of small-arms is based on tactical considerations. The Coast Guard definition shall take precedence in all cases involving transportation, handling, and stowage as cargo on board merchant vessels which are subject to the regulations in this part. This Coast Guard class does not require a permit. See § 146.29–13 and § 146.29–15.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
II-A						
Bulk propellants such as: Ballistite, Cordite, FNH, NH, and NC powders; propellant charges, "Madeup bag charges" in outside shipping containers.	Propellant explosives for cannon in bulk. Rocket propellants in bulk, Propellant charges (made-up charges) in cloth powder bags with igniter attached and with or without its primer and packed in outside metal or fiberpack containers. Includes but is not limited to: Ballistite (bulk) for any purpose in large grains, sheets, or masses. Cartridge starter, jet engine. Charge, propelling for rod, earth blast driven. Cordite. FNH powder. NC powder (SPD). NH powder (SPDN). Propellant charges for separate loading ammunition such as: 6", 8", 12", 14", 16", 155mm, 240mm, 280mm. SPCA powder. SPCG powder.	"Propellant explosives, solid, Class A." "Propellant explosives, solid, Class B." "Starter cartridge, jet engine."	A B B	Loose powder may be ignited by spark, friction, or intense heat. Powder dust is especially hazardous. Burns rapidly with excessive heat. Burning powder in ships hold may explode, producing structural damage and missiles. If involved in a fire, immediately apply water freely and in quantity.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Shall not be overstowed with any other kind of cargo except bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. When Class I ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Propellant charges of this class, for separate loading artillery projectile, filled with Class XI–A or XI–B chemical may be stowed together in the same hold or compartment provided the	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Packages shall be handled in such a manner as to insure that no spark or friction will occur. 4. Observe packages or containers for evidence of sifting or inability to retain contents and reject any showing such signs. 5. In event a package is damaged and powder is spilled, immediately stop operations and sweep up any loose powder. 6. Remove damaged container and residue of powder to a safe location. 7. Gravity roller conveyor shall not be used unless authorized by the Captain of the Port in ports or facilities under his jurisdiction. At other ports or facilities authority for such use may be granted by the Officer in Charge. 8. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 9. Cargo nets w/o trays, skipboards, pallets, or pieplates are not permitted. 10. The maximum permitted weight per draft when handled by pallet, skipboard, tray, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%.

						propellant charges are "top-stowed," the two items being separated by a type "A" dunnage floor. When so stowed, the propellant charges shall not be overstowed with any other cargo. For stowage adjacent to other dangerous articles see § 146.29–59. Bulk propellants shall not be loaded at an ammunition loading pier. May be transported in vans stowed on deck.	11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
Fixed ammunition without explosive projectile and like items.	II–B	Fixed ammunition with solid projectile, blind loaded projectile, empty projectile or without projectile—(the explosive components consisting of the primer and powder charges in a cartridge case); cartridge cases primed and containing powder charges; practice grenades; practice and target rockets. Includes but is not limited to: Ammunition for cannon: Blank. Blind loaded and plugged (BL & P). Blind loaded with tracer (BL & T). Empty projectile. Solid projectile. Without projectile. Ammunition, armor piercing, shot (w/o HE). Cartridges, blank, saluting. Cartridges, fixed and semifixed, with smoke projectiles (other than HC). Cartridges, impulse.	"Ammunition for cannon with empty projectile." "Ammunition for cannon with inert-loaded projectile." "Ammunition for cannon with solid projectile." "Ammunition for cannon w/o projectile." "Jet thrust units (JATO) Class B". "Special fireworks."	B B B B B B	The principal hazard associated with this class of ammunition is its involvement in a fire. Pressures which would cause serious structural damage are not usually generated. If involved in a fire, it is possible the fire may be controlled or extinguished by flooding or spraying with large amounts of water. Fire-fighting personnel should take appropriate	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Boxed and crated ammunition may be overstowed with nondangerous cargo and compatible explosives. Tanked ammunition may be overstowed with bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. May be stowed in the same deep tank,	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 4. Cargo nets without trays, skipboards, pallets or pieplates are not authorized. 5. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 6. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 7. Lifts of palletized units shall not be tiered except when using a sling so

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
	Cartridges, semi-fixed for Navy type guns: 5″/38, 5″/51, 5″/54, 6″/47. Cartridges, semi-fixed 120mm (Army w/o projectile). Charges: Catapult (other than aircraft personnel). JATO (DOT Class B). Rocket—target. Rocket motors (w/o rocket heads). Rocket, packed with but not assembled to inert rocket heads. Rocket, practice, assembled with inert head.			precautions and not expose themselves.	lower hold or tweendeck hold with Class II–F ammunition provided the Class II–F is bottom stowed and provided further that no other class of military explosives is stowed in the hold or the tank below. May be stowed in the same deep tank or lower hold with Class II–J ammunition provided the Class II–J is bottom stowed. For stowage adjacent to other dangerous articles see § 146.29–59. May be transported in vans stowed on deck. When Class X–C ammunition is stowed in the same hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Class III and VI ammunition may not be overstowed with this class of ammunition.	designed as to prevent the upper tier or tiers from shifting or falling from the draft. 8. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

II–C	Pyrotechnics (fireworks).	Fireworks are all manufactured articles designed primarily for the purpose of producing visible or audible pyrotechnic effects by combustion or explosion. Includes but is not limited to: Blue sump. Bomb, target identification. Cartridge igniter, turbo jet engine. Delay electric igniters. Depth charge markers, day. Destroyer, document, No. 3. Firecrackers, except M80. Fire starter. Fireworks—bombs. Fireworks—projectile. Flares of all types, such as: Aircraft. Airport. Bombardment. Float. High altitude parachute. Parachute. Parachute trip. Tow target. Trip. Flash cartridge 72 grains or under. Flash reducer (nonblack powder). Flash sheets (ltd. packing, DOT). Float lights. Fuse igniters. Fuse lighters. Fusee, warning, railroad. Grenade, hand or rifle, colored smoke (other than HC, WP, or WPW filled). Igniters, M1 and M2. Illuminating grenades and projectiles. Metal powders (ltd. packing DOT). Photoflash bomb M122. Photographic flash powder (ltd packing DOT). Pull wire fuse lighter. Pyrotechnic mixture. 72 grains or under. Quick match. Roman candles.	"Common fireworks." "Electric squibs." "Fuse igniters." "Fuse lighters." "Igniter." "Railway fuses." "Railway torpedoes." "Safety squibs." "Special fireworks."	C C C C C C B C B	The principal hazard is involvement in a fire. Some pyrotechnics may ignite spontaneously if exposed to moisture or high temperatures, but under these conditions most types tend to become less sensitive and more difficult to ignite. Aircraft flares and high burst ranging ground signals involved in a fire may explode. Most other types burn with intense heat and without serious explosion. If involved in a fire immediately apply water freely and in quantity. Steam or fog is also effective but less so than water. Fire fighting personnel should work from behind barriers and not expose themselves unnecessarily.	*AMMUNITION STOWAGE, DEEP TANK STOWAGE, PORTABLE MAGAZINE OR PYROTECHNIC LOCKER* Shall be stowed away from heat and in a dry location, protected against moisture contacting the stowage. Shall not be overstowed with any other kind of cargo. May be stowed in the same deep tank, lower hold or tween-deck hold with II–F provided the Class II–F ammunition is bottom stowed and provided that no other class of explosives or ammunition is stowed in the hold below such stowage. May be stowed in the same deep tank or lower hold as Class II–J provided the II–J ammunition is bottom stowed. For stowage adjacent to other dangerous articles see § 146.29–59. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drag, drop, tumble, walk or otherwise subject packages to shock. 3. Do not load during excessive rainy weather, unless complete protection against moisture coming in contact with the package is provided. 4. Do not use chute in loading or unloading. 5. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 6. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted. 7. Packages or containers shall be stowed in the position indicated by their marking. 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 10. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
	Salutes.					
	Separate loading smoke projectiles (other than HC, WP, WPW filled) when assembled with or without ejection charges and/or fuze.					
	Signals:					
	Aircraft float light.					
	Day distress aircraft.					
	Distress hand smoke.					
	Double star.					
	Drift day (bronze powder, inert).					
	Drift night (red phosphorous).					
	Emergency identification: smoke, star submarine.					
	Ground cluster.					
	Ground high burst ranging.					
	Ground parachute smoke.					
	Ground parachute star.					
	Highway.					
	Pistol rocket: Comet shower, smoke star.					
	Single star.					
	Submarine float.					
	Simulator:					
	Boobytrap, flash, illuminating, whistling, 72 grains or under.					
	Hand grenade, M116.					
	Smoke pots w/o oil.					
	Squibs of all kinds.					
	Tear gas pot fuse.					
	Torpedo signalling, railway.					
	Tracers.					
	Very signal lights.					
I–D						
Chemical ammunition, WP or PWP filled (solid).	All chemical ammunition, including fixed, semi-fixed and separate loading, filled with WP or PWP (white phosphorus) when assembled or packed with or w/o their ignition elements, bursting charges, fuzes or propellants.	"Ammunition for cannon with explosive-projectile." "Ammunition for	A A	The principal characteristic of white phosphorus is that of spontaneously	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE.*	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading.

WP or PWP shipped in bulk in drums, barrels, or other authorized shipping containers shall be classified as a flammable solid. WP or PWP when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including projectiles, bombs, and rocket heads, w/o ignition elements, bursting charges or fuzes), may be handled and stowed either as a flammable solid or as chemical ammunition Class II-D. Includes but is not limited to: Bombs, aircraft, WP or PWP filled. British Calling Cards. Fire leaves. Grenades, hand, WP or PWP filled. Grenades, rifle, WP or PWP filled. Igniters, phosphorus filled. Projectiles, WP or PWP filled packed w/ or w/o propellants. Rockets Heads, WP or PWP filled. Rockets, assembled w/motors, WP or PWP filled.	cannon with smoke projectile." "Explosive bomb."		igniting upon exposure to air, burning with an intensely hot flame, and giving off large volumes of white smoke. The fumes are highly discomforting. Burning phosphorus gives off phosphorus oxide which is toxic upon sustained exposure thereto. Phosphorus is intensely poisonous when taken internally. It becomes liquid at 111° F. Leakage which sometimes occurs, usually gives warning by smoke. Ammunition fitted with fuzes and boosters, if involved in a fire will usually explode with moderate violence thus tending to spread the fire rapidly. Apply water freely and in quantity to control spread of fire. Steam or fog is also effective but less so than water. It is necessary to keep the loose WP or PWP completely covered with water to prevent reignition. Organic material contaminated with	*PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* It is important to stow in locations not subject to temperatures above 100° F. When shipments of Army ammunition cannot be so stowed the following shall be complied with: WP or PWP filled items of ammunition shall be stowed in a nose up position unless other requirements are specified by the Army. The position of the nose end of the item of ammunition is marked on the outside package or container. Drums or other authorized DOT or Army Materiel Command specification containers filled with WP or PWP may be stowed in the same hold or compartment with chemical ammunition Class II-D. For stowage adjacent to other dangerous articles see § 146.29-59.	4. Observe packages or projectiles for leakage and reject any showing such signs. 5. Packages or containers shall be stowed in the position indicated by their marking. 6. Cargo handling stevedore gear may be trays, shipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 7. Cargo nets w/o trays, skipboards, pallets, or pieplates are not permitted. 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 10. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with WP or PWP. (See table Limiting Loads, Class X-A.) 12. Drums of WP or PWP shall not be handled by attaching hooks to the chime of the drums. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.
	"Explosive projectile."	A			
	"Igniter."	C			
	"Special fireworks."	B			
	Shipping name of item when shipped as flammable solid.	F, 8			

NOTE: The U.S. Army and Navy, when shipping ammunition filled with white phosphorus, mark such ammunition and the containers thereof with the word "smoke" and the symbol WP or PWP. The ammunition is also marked with one yellow band.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
				WP or PWP such as dunnage in the holds of vessels, must be removed and disposed of by burning. Otherwise after drying out, these substances are likely to reignite. Rockets, WP filled, assembled with motor and involved in a fire will present an additional hazard due to the propulsive nature of the rocket. Loose phosphorus in contact with skin tissue will adhere causing painful burns and continue to consume skin tissue until removed. A solution of copper sulphate is effective in counteracting this action. Use rubber protective gloves, boots, aprons, and gas masks to provide effective protection.	When given chemical ammunition stowage, see § 146.29–85 for additional requirements. May be transported in vans stowed on deck.	
II–E Chemical ammunition, HC filled (solid).	All chemical ammunition including fixed, semi-fixed and separate loading, filled with HC (Hexachlorethane, a smoke mixture) when assembled or packed w/ or w/o their ignition elements, bursting charges, ejection charges, fuzes or propellants.	"Ammunition for cannon with smoke projectile." "Explosive bomb."	A A	HC (hexachlorethane mixture) is subject to spontaneous ignition through the action of moisture on the HC mixture.	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE*	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Observe packages or projectiles for

HC mixture shipped in bulk in drums, barrels or other authorized shipping containers shall be classified as an oxidizing material. HC mixture when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including projectiles and bombs w/o ignition elements, bursting charges or fuzes) may be handled and stowed either as an oxidizing material or as chemical ammunition Class II–E. Includes but is not limited to: Bombs, aircraft, smoke, HC filled. Bombs, floating, smoke, HC filled. Bombs, smoke identification, HC filled. Float, smoke, HC filled. Grenades, hand, HC filled. Grenades, signal, HC filled. Grenades, colored smoke, HC filled. Pots, smoke, HC filled. Projectiles, artillery, smoke, HC filled. Projectiles, mortar, smoke, HC filled. NOTE: The U.S. Army and Navy, when shipping ammunition filled with HC smoke or colored smoke, and mark such ammunition HC smoke or colored smoke and mark the ammunition with one yellow band.	"Explosive projectile." "Special fireworks." Shipping name of item when shipped as oxidizing material.	A B Oxy. M.	Once started, the temperature rises quickly and may be sufficient to cause adjacent containers of HC to ignite. The reaction once started is self-supporting and requires no oxygen. Water can be applied freely to prevent spread of fire. The use of Foamite, CO2 or fog is less effective. Personnel fighting fire involving HC articles of ammunition, especially when stowed in the hold of a vessel, should avoid working in dense smoke if not wearing rescue breathing apparatus or gas masks. As there will probably be an oxygen deficiency in dense smoke, self-contained breathing apparatus should always be used in preference to gas masks.	*MAGAZINE, OR DEEP TANK STOWAGE* It is important to stow in locations not subject to temperatures above 100° F, and protected from moisture. Stowage shall be accessible from cargo hatch or other access means to the hold or compartment. Drums or other authorized DOT or Army Materiel Command specification containers filled with HC may be stowed in the same hold or compartment with chemical ammunition Class II–E. May be stowed in the same deep tank, lower hold or tween-deck hold with Class II–F provided the Class II–F ammunition is bottom stowed and provided further that no other class of military explosives is stowed in the hold or tank below. For stowage adjacent to other dangerous articles see § 146.29–59.	leakage and reject any showing such signs. 5. Packages or containers shall be stowed in the position indicated by their markings. 6. Cargo handling stevedore gear may be trays, skipboards, pallets or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 7. Cargo nets w/o trays, skipboards, pallets, or pieplates are not permitted. 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 10. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with HC mixture. (See table of Limiting Loads, Class X–A.) 12. Drums of HC mixture shall not be handled by attaching hooks to the chime of the drums. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
					When given chemical ammunition stowage, see § 146.29–85 for additional requirements. May be transported in vans stowed on deck. Class III may not be overstowed with this class of ammunition.	
II–F Chemical ammunition. FS or FM smoke filled (liquid).	All chemical ammunition including fixed, semi-fixed and separate loading filled with smoke, FS (sulfur trioxide in chlorsulfonic acid) or FM (titanium tetrachloride) when assembled or packed with or w/o their bursting charges, fuzes, or propellants. FS or FM shipped in drums, barrels, cylinders or other authorized containers shall be classified as a corrosive liquid. FS or FM when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including rocket heads, w/o bursting charges or fuzes) may be handled and stowed either as corrosive liquid or as a chemical ammunition Class II–F. Includes but is not limited to: Grenades, frangible, smoke FS or FM filled. Grenades, smoke, FS or FM filled. Rockets, FS or FM filled. Projectile, artillery, FS or FM filled. Projectile, mortar, FS or FM filled. Spotting charges, FS filled.	"Ammunition for cannon with smoke projectile." "Explosive projectile." "Rocket ammunition with smoke projectile." Shipping name of item when shipped as oxidizing material.	A A A Cor L.	FS (sulfur trioxide in chlorsulfonic acid) and FM (titanium tetrachloride) are liquids which fume badly when hot. They react violently with small amounts of water and form a dense white smoke upon release to the atmosphere. FS is highly corrosive both as a liquid and as a smoke. FM is corrosive in liquid only, but its smoke is very irritating. Leakage of FS or FM should be washed off immediately with large volumes of water.	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* It is important to stow away from heat and to protect from moisture. May be stowed in the same deep tank, lower hold or tween-deck hold with Classes II–C, II–E, II–G, and III provided the Class II–F ammunition is bottom stowed and provided further that	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Observe packages or projectiles for leakage and reject any showing such signs. 4. Containers or projectiles shall be stowed in the position indicated by their marking. 5. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 6. Cargo nets w/o trays, skipboards, pallets, or pieplates are not permitted. 7. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 8. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%.

NOTE: The U.S. Army and Navy, when shipping ammunition filled with FS or FM smoke, mark such ammunition and the containers thereof with the word "Smoke" and the symbol FS or FM. The ammunition is also marked with one yellow band.	Personnel working in a confined space where high concentrations of FS or FM smoke exists should use rubber protective gloves, boots, aprons and gas masks for effective protection.	no other class of explosives or ammunition is stowed in the hold or tank below. May be stowed in the same deep tank, lower hold or tween-deck hold with Classes II-B, IV, V, and VII provided the Class II-F ammunition is bottom stowed and provided further that no other class of explosives or ammunition is stowed in the hold or tank below. Drums or other authorized DOT or Army Materiel Command specification containers filled with FS or FM may be stowed in the same hold or compartment with chemical ammunition Class II-F. Shall not be stowed over other types of ammunition. For stowage adjacent to other dangerous articles see § 146.29-59. When given chemical ammunition stowage, see § 146.29-85 for additional requirements. May be transported in vans stowed on deck.	9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 10. Drums of FS or FM shall not be handled by hooks attached to the chime of the drums. 11. The limiting weights noted above are for a 5 ton boom. See § 146.29-41.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
II-G Chemical ammunition. Incendiary composition, IM, PT or NP filled (oil gel).	Chemical ammunition filled with IM, PT or NP (thickened fuels) when assembled or packed with or w/o ignition elements, bursting charges or fuzes. IM, PT or NP shipped in drums, barrels or other authorized shipping containers shall be classified as a flammable solid. IM, PT or NP when shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including bombs w/o ignition elements, bursting charges or fuzes) may be handled and stowed either as a flammable solid or as chemical ammunition Class II-G. Napalm B in containers identified as DOD BLU-27/B, BLU-29/B, and BLU-32/B Anti-Pam bombs overpacked in outside shipping containers must be shipped as "Flammable Liquid, N.O.S." Includes but is not limited to: Bombs. Bombs, cluster incendiary. Frangible grenades. NOTE: The U.S. Army and Navy, when shipping ammunition filled with these incendiary compositions, mark such ammunition or containers thereof with the Army Materiel Command symbol of the filler and one purple band.	"Explosive bomb." "Grenade, hand." "Special fireworks." Shipping name of item when shipped as flammable solid.	A A B F.S.	The principal hazard of IM, PT or NP filled items is involvement in a fire. They burn rapidly with intense heat. Extinguishment of fires is best accomplished by means of water fog. Fog foam or a foam steam (mechanical or chemical) is likewise effective. CO_2 should not be used unless the fire is small and in its incipient stage. In holds of a vessel large volumes of water are recommended as a cooling agent provided such may be employed without "floating off" burning gel. The vapors from heated napalm are toxic and rescue breathing apparatus should be worn while working in noticeable concentrations. Clusters of incendiary bombs in this category may contain a certain percentage of bombs having a high explosive charge capable of causing	*AMMUNITION STOWAGE, CHEMICAL AMMUNITION STOWAGE, PORTABLE MAGAZINE, OR DEEP TANK STOWAGE* Shall not be stowed within 10 feet of a heat bulkhead. May be stowed in the same deep tank, lower hold or tween deck hold with Class II-F provided the Class II-F ammunition is bottom stowed and provided further that no other class of explosives or ammunition is stowed in the hold or tank below. May be stowed in a deep tank or lower hold with Class II-J incendiary ammunition provided the Class II-J is bottom stowed. For stowage adjacent to other dangerous articles, see § 146.29–59. When given chemical ammunition stowage, see § 146.29–65 for	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages, containers or bombs to shock. 3. Do not use chute in loading or unloading. 4. Observe packages, containers or bombs for failure or inability to retain contents and reject any showing such signs. 5. Packages, or containers shall be stowed in the position indicated by their marking. 6. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 7. Cargo nets w/o trays, skipboards, pallets or pieplates are not permitted. 8. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 9. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 10. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with IM, PT or NP (See table of Limiting Loads, Class X-A.) 12. Drums of IM, PT, or NP shall not be handled by attaching hooks to the chime of the drums. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

			fragments which could be dangerous to fire-fighting personnel. Incendiaries of this type may contain ignition components of WP adding an additional hazard.	additional requirements. May be transported in vans stowed on deck.	
II-H					
Chemical ammunition. Water activated.	Chemical ammunition filled with sodium, calcium carbide, calcium phosphide, lithium hydride, with or w/o explosive components. Includes but is not limited to: Beacons, NEA. Can, false target. Depth charge markers, night. Grenades, sodium filled. Igniters, sodium filled. Pots, torpedo torch. Projectile, false target.	There are no provisions in the current DOT regulations for the marking of this class of ammunition.	On contact with moisture, metallic sodium or lithium hydride will liberate large quantities of hydrogen gas thus producing an explosive hazard. The reaction of metallic sodium with water is sufficiently violent to cause ignition of the liberated hydrogen. Fumes from burning sodium are caustic. On contact with moisture, calcium	*SPECIAL STOWAGE* On deck in a portable magazine, in a deck house or other location readily accessible for jettisoning. Stowage shall be waterproof. Shall not be stowed with any other class of military explosives or any other dangerous articles. May be transported in vans stowed on deck.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Do not load during excessive rainy weather unless complete protection against moisture coming in contact with the package is provided. 5. Observe packages or containers for evidence of sifting or inability to retain contents and reject any showing such signs. 6. In event a package is damaged and powder is spilled, immediately stop operations and sweep up any loose powder. 7. Remove damaged container and residue of powder to a safe location.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
				carbide or calcium phosphide will liberate phosphine and acetylene gases. The phosphine is toxic but extremely unstable, ignites spontaneously and at the same time ignites the acetylene gas. Fires involving these items cannot be extinguished by water, carbon dioxide or foam. Smothering with an inert substance such as dry sand or dry soda ash offers effective control. Jettisoning should not be accomplished in a port or roadstead as the floats will continue to burn until filler is consumed jeopardizing other vessels and piers.		8. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 9. Cargo nets w/o trays, skipboards, pallets or pieplates are not permitted. 10. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
II–J Chemical ammunition TH incendiary composition filled (solid).	All chemical ammunition filled with incendiary composition TH (thermite, thermate or thermate magnesium) with or w/o fuze or explosive element. Includes but is not limited to: Bombs, incendiary cluster. Grenades thermate. Incendiary safe destroyers. Thermite burning charges.	"Explosive bomb." "Grenade, hand." "Igniter." "Special fireworks."	A A C B	The principal hazard of TH filled items is involvement in a fire. They burn rapidly with intense heat and usually form large quantities of molten iron. The presence of a	*DEEP TANK STOWAGE, AMMUNITION STOWAGE OR PORTABLE MAGAZINE* May be stowed only in deep tank or lower	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Observe packages or containers for evidence of failure or inability to retain contents and reject any showing such signs.

		Thermite charges under water. Thermite igniters. Thermite units 10 lbs. NOTE: The U.S. Army and Navy, when shipping ammunition filled with these incendiary compositions, mark such ammunition or containers thereof with the Army Materiel Command symbol of the filler and with one purple band.			small explosive charge in some TH items forms an additional hazard in case of a fire. Carbon dioxide and carbon tetrachloride extinguishers should not be used to combat fires involving TH because the reaction of carbon tetrachloride with molten metal produces toxic gases and that of carbon dioxide on magnesium may produce an explosion. In the hold of a vessel large volumes of water are recommended as an extinguishing agent. Fire fighters should work from behind barriers when possible.	hold, only with Classes I, II–B, II–C, II–G, and IV and in all cases must be bottom stowed. For limited quantity shipment not in excess of 500 lbs. net TH content, see § 146.29–99(b), Note D. For stowage adjacent to other dangerous articles see section 146.29–59.	5. Cargo handling stevedore gear may be trays, skipboards, pallets or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 6. Cargo nets w/o trays, skipboards, pallets or pieplates are not permitted. 7. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate, fitted with cargo net or sideboards shall not exceed 4,000 lbs. plus 10%. 8. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 10. Wire rope slings are permitted when handling unboxed bombs or containers filled with TH. (See table of Limiting Loads, Class X–A.) 11. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
III	Fuzes, PD w/o boosters; fuzes, AT mine, nonchemical, w/o boosters; fuzes, bomb tail, w/o boosters; fuzes, tracer; primer	Point fuzes w/o boosters for projectiles and rockets; antitank mine fuzes (non-chemical) w/o booster; bomb tail fuzes w/o boosters; primer detonators, cannon primers, other than lock primers, when packed in separate shipping containers. Many DOT Class C fuzes, with or w/o boosters, are also of this class. If these fuzes are shipped with boosters, they must be so made and packed that they will not cause functioning of other fuzes, explosives or explosives devices if one of the fuzes detonates in a shipping container. Includes but is not limited to: Case combination primer.	"Cannon primers." "Combination fuzes." "Combination primers." "Igniter, jet thrust." "Percussion caps." "Percussion fuzes." "Time fuzes." "Tracer fuzes."	C C C B C C C C	The amount of explosives in single items of this class varies from 30 to 500 grains. It is likely they will explode progressively. Structural damage caused by the pressures generated would probably be limited to the immediate vicinity. Missiles are light and	*AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE.* This class of ammunition shall not be overstowed with any other cargo or ammunition except Classes VI and VIII. May be stowed in the	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Gravity roller conveyors not authorized. 4. Do not use chute in loading or unloading. 5. Trays with sideboards shall be used when loading by mechanical means. 6. Packages shall not be stacked on a tray to a height above its sideboards. 7. Trays shall not be swung unnecessarily over open hatches or holds containing military explosives or other dangerous cargo.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
detonators; primers, etc.	Case electric primer. Case percussion ignition primer. Case percussion primer. Combination electric and percussion primer. Fuze, anti-tank, mine (non-chemical) w/o booster. Fuze, base percussion. Fuze, bomb tail, w/o booster. Fuze, PD w/o booster. Fuze, percussion. Fuze, MTSQ w/o booster. Fuze, tracer. Fuze, TSQ w/o booster. Grenade, hand, practice. Igniter, Jato, such as M151. Igniter for rockets, i.e. M12, M18, M20. Magazine, extension primers. Mines practice with spotting charge and/or fuse. Percussion primers other than lock. Primer, detonators, fuze, bomb, various delays.			usually fall within 300 feet. These types of ammunition are loaded with explosives that are sensitive to shock and friction. Shock and fire are the principal hazards to this type of ammunition. If involved in a fire, firefighting personnel should take normal precautions and not expose themselves unnecessarily. Fire may be controlled and extinguished by flooding or spraying with large amounts of water.	same lower hold or tween-deck hold with Class II-F provided the Class II-F is bottom stowed and provided further that no other class of military explosives is stowed in the hold below or the deep tank directly below. For stowage adjacent to other dangerous articles see § 146.29-59.	8. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock absorbing material. 9. Packages shall be stowed in the position indicated by their markings. 10. The maximum permitted weight per draft when handled by tray with sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tiers from shifting or falling from the draft. 13. A portable magazine in which this class of ammunition is stowed and hoisted on board a vessel as a unit load shall not exceed 4,000 lbs. plus 10%. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.
IV Fixed and semifixed ammunition with explosive loaded projectile.	Fixed and semifixed ammunition, packed as complete rounds (including artillery, mortar and gun ammunition) grenades and rockets, when assembled with explosive projectiles or bursting charge. Small-arms ammunition with explosive bullets or projectiles. Includes but is not limited to: Anti-personnel mine, M2 and M3. Artillery ammunition of calibers 0.75" to 5" inclusive, with explosive, illuminating or incendiary projectiles. Grenades, hand, defensive. Grenades, hand, defensive, TNT filled, fuzed or unfuzed. Grenades, hand, fragmentation.	"Ammunition for cannon with explosive projectile." "Ammunition for cannon with incendiary projectile." "Ammunition for small arms with explosive bullets." "Ammunition for small arms with explosive	A A A A	Articles in this class present a severe fire hazard and usually explode progressively, only a few boxes at a time, many explosions of individual rounds being of a very low order. Pressure which would cause serious structural damage is not usually generated.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Boxed and crated ammunition may be overstowed with nondangerous cargo and compatible explosives. Tanked ammunition may be overstowed with bomb fin assemblies, empty	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Cargo handling stevedore gear may be trays, skipboards, pallets or pieplates, provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 4. Cargo nets without trays, skipboards, pallets or pieplates are not authorized. 5. The maximum permitted weight per draft when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%.

Grenades, rifle, AT. Grenades, rifle, HE filled. Gun ammunition of calibers 0.75" to 5" inclusive, with explosive, illuminating or incendiary projectiles. Mortar ammunition (explosive or illuminating). Rockets, with explosive heads packed in the same container with, but not assembled to motors. Rockets, 2.75" FFAR, assembled or unassembled. Rockets, 3.5" HEAT. Small-arms ammunition with explosive bullets.	projectile." "Hand grenades." "Rifle grenades." "Rocket ammunition with explosive projectile." "Rocket ammunition with illuminating projectile."	 A A A A	Most missiles would fall within 600 feet. If involved in a fire it is possible the fire may be controlled or extinguished by flooding or spraying with large amounts of water. Firefighting personnel should take appropriate precautions and not expose themselves unnecessarily.	water fillable practice bombs and empty auxiliary gas tanks. May be stowed in the same deep tank, lower hold or tween-deck hold with Class II–F ammunition provided the Class II–F is bottom stowed and provided further that no other class of military explosives is stowed in the hold or tank below. May be stowed in the same deep tank or lower hold with Class II–J ammunition provided the Class II–J is bottom stowed. For stowage adjacent to other dangerous articles see § 146.29–59. When Class X–G ammunition is stowed in the same hold with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Class III and VI may not be overstowed with this class of ammunition.

6. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%.

7. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft.

8. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
V Separate loading projectiles filled with explosive "D".	Separate loading projectiles of all calibers filled with explosive "D", fuzed or unfuzed; and projectiles filled with explosives "D", fuzed or unfuzed, not assembled to or packed with cartridge cases. Explosive "D" is used as a bursting charge for all projectiles which must withstand severe stresses and shocks before detonating: such as armor-piercing projectiles. Includes but is not limited to: Armor piercing projectiles. Deck piercing projectiles. NOTE: In general, Classes V and VII types of projectiles will be shipped in accordance with the following basic rules: Point fuzed projectiles with false ogives will be crated. Point fuzed projectiles without false ogives will have grommets and eyebolt lifting plugs. Base fuzed projectiles with relatively fragile parts such as false ogives, steel caps and windshields will be crated. Base fuzed projectiles without false ogives will not be crated but will have grommets. All Navy 6" through 16" separate loading projectiles are explosive "D" loaded.	"Explosive projectile."	A	If involved in a fire will very likely detonate as a result of exposure to heat. These projectiles usually explode one at a time and in practically all cases with low order explosion. There is no certainty that en masse explosion will not occur. Most missiles will fall within 1,200 feet.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* This ammunition, boxed, unboxed, or palletized units thereof, may be overstowed. Care must be taken not to damage rotating bands of projectiles that are not in containers. May be stowed in the same deep tank, lower hold or tween deck hold with Class II–F ammunition provided the Class II–F is bottom stowed and provided further that no other class of military explosives is stowed in the hold below or in the tank below. Class V when unfuzed and no fuzes packed in container may be stowed with Class X–A. For stowage adjacent to other dangerous articles see section 146.29–59. Classes III and VI may not be overstowed with this type of ammunition.	1. Handle by hand or mechanical means 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Bare projectiles shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Protect rotating bands from damage. Avoid injury to or removal of paint or grease from bourrelet. 6. When handling items packed in outside containers, cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates, provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 7. Projectile tongs or lifting stud and eye are authorized. Wire slings of a design approved by the Captain of the Port may be used. 8. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 9. The maximum permitted weight per draft when handled by tray, skipboard, pallet, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 10. Single projectiles weighing in excess of 2,201 lbs. must be loaded or unloaded one at a time. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed so as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

VI BD fuzes. Bomb fuzes with boosters. PD fuzes with boosters. Rocket fuzes with boosters	Base detonating fuzes (for all calibers) and PD fuzes with boosters; bomb and rocket fuzes with boosters; auxiliary booster assembled to or packed with the fuze; depth charge pistol with detonator and with or without booster assembled to or packed with pistol. (For boosters, auxiliary boosters, bursters, etc., having no initiating or priming elements and packed independently, see Class X-A.) Includes but is not limited to: Adapter booster, with detonator. Auxiliary booster, with detonator. Boosters. Burster, with detonator. Depth charge pistol, with detonator and with or without booster. Detonating fuzes, Class A. Fuze: Auxiliary detonating. Base detonating (for all calibers). Bomb nose. Bomb tail with booster. Hydrostatic bomb. Hydrostatic bomb tail. Point detonating with booster. Rocket. Fuzes with boosters assembled thereto. Mine, anti-personnel, non-metallic, M14. Mine firing mechanism, C-1.	"Detonating fuzes, Class A."	A	The amount of explosives in single items does not usually exceed one-half pound. It is likely they would explode progressively. Structural damage caused by the pressure generated would probably be limited to the immediate vicinity. Missiles are light and usually fall within 600 feet. These types of ammunition are loaded with explosives that are sensitive to shock and heat. If involved in a fire, it is possible the fire may be controlled or extinguished by flooding or spraying with large amounts of water. Firefighting personnel shall take appropriate precautions and not expose themselves unnecessarily.	*AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE* This class of ammunition shall not be overstowed with any other cargo or military explosives except Classes III and VIII. For stowage adjacent to other dangerous articles see § 146.29–59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Gravity roller conveyors not authorized. 4. Do not use chute in loading or unloading. 5. Trays with sideboards shall be used when loading by mechanical means. 6. Packages shall not be stacked on a tray to a height above its sideboards. 7. Trays shall not be swung unnecessarily over open hatches or holds containing military explosives or other dangerous cargo. 8. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock-absorbing material. 9. Packages shall be stowed in the position indicated by their markings. 10. The maximum permitted weight per draft when handled by tray with sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. A portable magazine in which this class of ammunition is stowed and hoisted on board a vessel as a unit load shall not exceed 4,000 lbs. plus 10%. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
VII Separate loading HE projectiles, mass, detonating, with other than explosive "D".	Separate loading projectiles of all calibers, fuzed or unfuzed, except those loaded with explosive "D"; and loaded projectiles except those loaded with explosive "D", fuzed or unfuzed, not assembled to or packed with cartridge cases; fuzed cluster fragmentation bombs, rocket heads fuzed or unfuzed and less than 200 lbs. gross weight, anti-tank mines, packed with fuzes in same container or box. Includes but is not limited to: Anti-tank mines, packed with fuzes in same container or box. Cluster, fragmentation bomb (with individual bombs fuzed but without cluster fuzed). High explosive anti-tank projectile. High explosive projectile. Rocket heads fuzed or unfuzed and under 200 lbs. not assembled to or shipped with rocket motors. Wafers of fragmentation bombs (with individual bombs fuzed). NOTE: In general, Classes V and VII types of projectiles will be shipped in accordance with the following basic rules: Point fuzed projectile with false ogives will be crated. Point fuzed projectile without false ogives will have grommets and eyebolt lifting plugs. Base fuzed projectile with relatively fragile parts such as false ogives, steel caps, and windshields will be crated. Base fuzed projectiles without false ogives will not be crated but will have grommets to protect rotating bands.	"Explosive bomb." "Explosive mine." "Explosive projectile."	A A A	The principal hazard in transportation will be involvement in fire from sources other than the ammunition itself. Projectiles or bombs in this class may explode progressively but very likely en masse. Most missiles will fall within 1,800 feet and detonation will result in severe structural damage increasing in severity and range in relation to the amount of high explosives involved.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* This ammunition boxed, unboxed, or palletized units thereof, may be overstowed. Care must be taken not to damage rotating bands of unboxed projectiles. This class of ammunition when unfuzed and no fuzes packed in container may be stowed with Class X–A. For stowage adjacent to other dangerous articles see § 146.29–59. May be stowed in the same deep tank, lower hold or 'tween deck hold with Class II–F ammunition provided the Class II–F is bottom stowed and provided further that no other class of military explosives is stowed in the hold or tank below. When Class X–C ammunition is stowed in the same	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Bare projectiles shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Protect rotating bands from damage. Avoid injury to or removal of paint or grease from bourrelet. 6. When handling items packed in outside containers, cargo handling stevedore gear may be trays, skipboards, pallets or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 7. Projectile tongs or lifting stud and eye are authorized. Wire slings of a design approved by the Captain of the Port may be used. 8. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted. 9. The maximum permitted weight per draft when handled by tray, skipboard, pallet, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 10. Single projectiles weighing in excess of 2,201 lbs. must be loaded or unloaded one at a time. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

					hold or magazine with this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor.	
VIII						
AT mine fuzes (chemical), etc. Blasting caps. Detonators.	Blasting caps of all types; detonators, grenade fuzes, detonating type; fuzes, anti-tank mine (chemical). Includes but is not limited to: Blasting caps. Blasting caps with safety fuze. Destructor, explosive, M10 and MK2 Mod O. Detonating grenade fuzes. Detonators, all types. Detonators, torpedo. Electric blasting caps. Fuzes, AT mine (chemical). Percussion elements (Army). Primers, electric. Priming assembly for demolition outfit M K104.	"Blasting caps." "Blasting caps with safety fuze." "Boosters (explosive)." "Detonating fuzes, Class A." "Electric blasting caps." "Percussion caps." "Percussion fuzes." "Time fuzes."	(*) (*) A A (*) C C C *Class A (more than 1000). Class C (1000 or less).	The two primary hazards in the transportation of these devices are shock and involvement in fire. A collateral hazard is the effect of the detonating of these articles upon other explosives or ammunition stowed in proximity to such articles. All of this class ammunition in a unit stowage may explode at one time, but as the total amount of explosives involved is limited structural damage would not tend to be great. Light missiles having limited range would be formed.	*MAGAZINE STOWAGE "A", SPECIAL STOWAGE, OR PORTABLE MAGAZINE* The location of magazines is restricted to a hold or compartment in which no other explosives or ammunition (except Classes I, III, and VI) are stowed. Shall not be stowed within 8 feet of the vessel's side except blasting caps stowed in a portable magazine "On deck" need not meet this requirement. This class of ammunition shall not be overstowed with any other cargo. For detail of stowage see § 146.29–93. For stowage with other dangerous articles see § 146.29–59.	Ammunition of Class VIII constitutes a distinct class of ammunition when not assembled in projectiles, bombs, or other ammunition. These types of ammunition are loaded with explosives that are sensitive to shock. The handling and stowage provisions of these regulations give consideration to the probable effect accidental detonation of these devices may have upon other ammunition or explosives stowed within the vessel. 1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Gravity roller conveyors are not authorized. 4. Do not use chute in loading or unloading. 5. Trays with sideboards shall be used when loading by mechanical means. 6. Packages shall not be stacked on a tray to a height above its sideboards. 7. Trays shall not be swung unnecessarily over open hatches or holds containing military explosives or other dangerous articles. 8. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock absorbing material. 9. Packages shall be stowed in the position indicated by their markings. 10. The maximum permitted weight per draft when handled by tray with sideboards shall not exceed 1,000 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 2,400 lbs. plus 10%.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
						12. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 13. A portable magazine in which this class of ammunition is stowed and hoisted on board a vessel as a unit load shall not exceed 2,400 lbs. plus 10%. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
IX-A Explosives in bulk such as: Black powder. Propellant explosives for small-arms, etc.	Black powder in bulk, ballistite for small-arms, propellant explosives for small-arms, black blasting powder, flash powder and powder having similar hazard characteristics to those named. Includes but is not limited to: Ballistite for small-arms. Black blasting powder. Black fuze powder. Black pellet powder. Black powder. Black powder and magnesium mixtures. Black powder, unglazed. Black rifle powder. Black shell powder. Bull's eye powder #2. Cannon powder. Charges. Lyle gun. Charges, spotting, black powder, M1A1, M3, . M4. E. C. blank fire powder. FF black powder. Firecracker, M80. FFFG black powder. Flash cartridges over 72 grains. Flash powder sheets inner unit over 2 ounces. Flash reducer (black powder with potassium sulfate). Flash sheets in bulk.	"Black powder." "High explosives." "Low explosives." "Propellant explosives, solid, Class A." "Propellant explosives, solid, Class B."	A A A A B	Group IX-A explosives constitute a group having relatively similar hazard characteristics which principally consists of being very susceptible to ignition by spark or friction. They burn with explosive violence and under even slight confinement are likely to explode en masse. They are adversely affected by high temperature. Powder dust is especially hazardous.	*MAGAZINE STOWAGE "A" OR PORTABLE MAGAZINE STOWAGE* When Class I ammunition is stowed in the same hold or magazine with this Class the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. Shall not be overstowed with any other kind of cargo. For stowage with other dangerous articles see § 146.29–59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Packages shall be handled in such a manner as to insure that no spark or friction will occur. 4. Observe packages or containers for evidence of sifting or inability to retain contents and reject any showing such signs. 5. In event a package is damaged and powder is spilled, immediately stop operations and sweep up any loose powder. 6. Remove damaged container and residue or powder to a safe location. 7. Gravity roller conveyor not authorized. 8. Drums and kegs shall be stowed on end with bungs up. Metal cans shall be stowed with filling openings up. Packages or containers shall be stowed in the position indicated by their markings. 9. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 10. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted

		Flashlight powder in bulk. High vel #65. Igniter pads. Igniter, rocket motor, Class A. IMR #1185. IMR #4166. IMR #4676. Low blasting explosives. Pistol powder #5. Propellant explosives (for small arms). Pyrotechnic mixture, in excess of 72 grains. Rifle powder. Simulator: Boobytrap, flash, illuminating, whistling, in excess of 72 grains. Boobytrap, whistling, M114. Gunflash, M110. Projectile, air burst. Projectile, ground burst M118. Smoke puff charge. Sodium nitrate black powder. Spherehexagonal black powder. Sporting powder. Sulfurless black powder.					11. The maximum permitted weight per draft when handled by tray, skipboard, pallet, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 12. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 13. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tie from shifting or falling from the draft. 14. The limiting weights noted above are for a 5–ton boom. See § 146.29–41.
High explosives such as: Demolition blocks, etc. Dynamite. TNT	IX–B	High explosives in bulk, items of high explosive such as shaped charges for demolition or other purposes, and powder in bulk, possessing the characteristics of being likely to detonate en masse. Includes but is not limited to: Amatex. Amatol. Ammonite. Ammonium perchlorate particle size: 15 microns and less. Ammonium picrate. Ammonol. Anchor charges. Aqueous snakes. A. S. A. pellets. Atlas amodyn. Balls of cellulose nitrate. Baranol. Beehive charges. Blasting gelatin.	"High explosives."	A	High explosives in bulk, and demolition blocks have relatively similar hazard characteristics. They may be considered stable in stowage. Can be ignited by spark or friction and detonated by shock. When ignited will burn vigorously. Bulk shipments in amounts likely to be found on board vessels would, if ignited, be very likely to detonate.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Shall not be stowed in the same hold or compartment with other compatible ammunition, or explosives, unless the two are separated by a partition bulkhead or a Type "A" dunnage floor. Shall not be overstowed with any other kind of cargo. For stowage adjacent to other dangerous	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble or walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Packages shall be handled in such a manner as to insure that no spark or friction will occur. 5. Observe packages or containers for evidence of shifting or inability to retain contents and reject any showing such signs. 6. In event a package is damaged and powder is spilled, immediately stop operations and sweep up loose powder. 7. Remove damaged containers and residue of powder to a safe location. 8. Gravity roller conveyors not authorized. 9. Packages or containers shall be stowed in the position indicated by their markings.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
	British beehive. C. E. pellet. Charge, demolition, block. Charge, demolition, chain. Chlorate explosives, dry. Chlorate propellants. Clams, M3. Composition "A," etc. Composition "B," "B2," etc. Composition "C," "C2," etc. Cratering charges. Cyclonite, RDX. Cyclotol. Demolition blocks. Depth bomb explosives. Dynamite. Ednatol. Explosive "D" (Ammonium picrate). Explosive gelatin. 808 plastic. Gelatin dynamite. Gelignite. General wade. Grenite. Guncotton. HBX. H6. Haleite. Hayrick charges. Hercomite. Heogen. HMX. Limpet. Minol. Negative cotton. Nitrocellulose, dry. Nitroguanidine, dry. Nitrostarch, dry. Nitrourea.				articles see § 146.29–59. Military dynamite when transported on a commercial vessel simultaneously with commercial dynamite, and no other military explosives are on board, shall be shipped under those requirements set forth for the shipment of commercial dynamite.	10. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 11. Cargo nets without trays, skipboards, pallets, or pieplates are not permitted. 12. The maximum permitted weight per draft when handled by pallet, skipboard, tray, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 13. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 14. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent the upper tier or tiers from shifting or falling from the draft. 15. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

Nobel's ammonal (704B).
Nobel's explosives (808).
PEP 1, 2, and 3.
Pentolite
Picrates, dry.
Picric acid, dry or wet.
Plastic explosives.
PTX, 1 and 2.
RDX.
Reddy Fox.
Seachest demolition blocks.
Shaped charges.
Shellite.
Snake demolition explosives charges.
Supplementary charges.
Tetryl.
Tetrytol
TNT.
TNX.
Torpex.
Tridite.
Trilite.
Trimonite.
Trinitroaniline.
Trinitrobenzene.
Trinitrocresol.
Trinitrophenylmethylnitramine.
Trinitroresorcinol.
Trinitronal.
Trinitrotoluene.
Trinitroxylene.
Trinitroxylol.
Triton blocks.
Trojan powder.
Urea nitrate, dry or wet.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
IX–C						
Initiating and priming explosives in bulk.	Initiating and priming explosives when shipped in bulk. Includes but is not limited to: Giazodnitrophenol (DDNP, DINOL). Guanyl-nitrosamino-guanilidene-hydrazine. Guanyl-nitrosamino-guanyl-tetrazene. Lead azide. Lead styphnate. Lead trinitroresorcinate. Mercury fulminate. Nitro mannite. Nitrosoguanidine. Pentaerythrite tetranitrate. PETN. Tetrazene. NOTE: Bulk priming or initiating explosives in dry condition are not permitted to be transported on board vessels.	"Initiating explosive."	A	Bulk initiating and priming explosives constitute a distinct class of explosives. They are extremely sensitive to shock. The only permitted packing for transportation in bulk consists of a sift proof cotton duck, rubber or rubberized cloth bag in a metal barrel or drum or wooden barrel or keg and wet with 20 to 40% of water or water alcohol mixture. Mercury fulminate and lead azide also have 3" of saw-dust saturated with water between the bag and the outer container.	*MAGAZINE STOWAGE "A", SPECIAL STOWAGE OR PORTABLE MAGAZINE STOWAGE* Shall not be stowed in the same magazine with other ammunition or explosives. When tiering containers of explosives of this class in a magazine, have each tier floored off with a type "A" dunnage floor. The location of a magazine is restricted to a hold or compartment in which no other military ammunition (except Class I) is stowed. Shall not be stowed within 8 feet of vessel's side. This class of ammunition shall not be overstowed with any other cargo. For stowage adjacent to other dangerous articles see § 146.29–59.	1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Do not roll barrels on their bilges. 5. Gravity roller conveyer not authorized. 6. Barrels or drums contain 20 to 40% water or water alcohol mixture. 7. Observe barrels, drums or containers for evidence of leakage or inability to retain contents and reject any showing such signs. 8. In event a container is damaged immediately stop operations and carefully remove damaged container to a safe location. 9. Drums and kegs shall be stowed on end with bungs up. Containers shall be stowed in the position indicated by their markings. 10. Trays with sideboards shall be used when handling by mechanical means. 11. Containers shall not be stacked on a tray to a height above its sideboards. 12. The maximum permitted weight per draft when handled by tray fitted with sideboards shall not exceed 1,000 lbs. plus 10%. 13. Trays shall be hoisted and lowered carefully and deposited without undue shock on a mattress or other shock absorbing material. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

X–A						
Explosive bombs, mines, torpedoes, etc.	Bombs, bomb clusters, mines, depth charges, warheads (all unfuzed), rocket heads (fuzed or unfuzed and without motors 200 lbs. or more gross weight); torpedo bangalore (unfuzed); and other unfuzed ammunition filled with relatively large amounts of HE; all possessing a similar hazard characteristic of en masse detonation. Includes but is not limited to: Activator—without detonator. Bombs: Armor-piercing. Demolition. Depth. Depth charge. Fragmentation. G. P. Photoflash. S. A. P. Shallow water depth. Boosters—without detonators. Boosters, adapter—without detonators. Burster—without detonator. Mines: Aerial. Aircraft. Anti-personnel (unfuzed). Anti-personnel fragmentation (unfuzed). Anti-tank (unfuzed). Anti-tank non-metallic (unfuzed). Grenade. High explosive. Land. Rocket heads (fuzed or unfuzed and without motors 200 lbs. or more gross weight). Signal, underwater sound, w/o fuze.	"Booster (explosive)." "Burster (explosive)." "Explosive bombs." "Explosive mines." "Explosive projectiles." "Explosive torpedoes."	A A A A A A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of their tendency to detonate en masse if involved in a fire or subjected to shock. Detonation will result in severe structural damage, increasing in severity and range in relation to the amount of high explosives involved. All high explosive loaded items in this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impacts, though not sufficiently severe to rupture them has occasionally resulted in partial or complete detonation, and such kind of ammunition is said to possess "container-dent sensitivity".	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Items in this class having thin container walls and said to possess "container-dent sensitivity" shall not be tiered one layer on top of another unless they are boxed crated or dunnaged in such a manner that they are properly protected to withstand the superimposed weight. Items having thin walls and possessing "container-dent sensitivity" may be overstowed only with very light cargo such as bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. Items of this class having thick walled containers may be tiered one layer on top of another	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skipboard, or tray, or as a preventer or save-all. 5. Bombs, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powdered roller conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Unboxed or uncrated warheads, depth bombs, depth charges, or other thin walled items shall not be tiered in "making up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition. 8. Depth charges and rocket heads that are not boxed or crated shall be loaded by use of pallet, skipboard or tray fitted with cargo net or sideboards. 9. Bombs, except depth bombs, may be loaded by use of wire rope slings, or by pallet, skipboard or tray fitted with cargo net or sideboards. 10. Depth bombs shall be loaded only by using pallet, skipboard, or tray fitted with cargo net or sideboards. (See § 146.29-39.)

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
	Torpedo bangalore. Torpedo warheads.			A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact apparently causes instantaneous explosive action. But whatever may be the actual mechanics of this phenomenon, the kinds of impacts known to have caused explosion of these items include such impacts as dropping on or striking against a rounded corner, similar to a hatch coaming, impact of one bomb against another, or being struck by handling and transportation equipment. In placing or removing dunnage, an accidental or misdirected blow from a sledge hammer, pinch bar or other hand tool may cause such explosions. The impact need not be violent. A short drop of only 2 feet caused a low order detonation of a depth bomb	provided they are so stowed, dunnaged, blocked and/or braced as to prevent movement that is likely to damage the ammunition, the vessel or other cargo. Shall not be overstowed with inert permitted cargo having lesser bearing surface or greater unit weight than any item stowed below. Classes I, V (unfuzed and no fuzes packed in container), VII (unfuzed and no fuzes packed in container), and IX-B may be stowed with this class: Provided that the two classes are separated by a partition bulkhead or type "A" dunnage floor. Except for wooden barrels or boxes and fiberboard containers, no flammable or combustible material as cargo shall be stowed in a hold or compartment in which this class of ammunition is stowed. When photoflash bombs are stowed	11. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 12. Single slings made up in multiple assembly with spreader may be used in handling bombs that do not exceed 1,101 pounds each. Two-legged slings shall be used in handling bombs of more than 1,101 pounds each. *TABLE OF LIMITING LOADS* (Applicable when handling bombs by sling method) Weight of individual bomb or cluster: *Maximum units in one draft* 1 lb. to 250 lbs. [1]—8 276 lbs. to 500 lbs. [1]—6 551 lbs. to 1,000 lbs. [1]—4 1,101 lbs. to 2,000 lbs. [1]—2 Over 2,200 lbs.—1 [1]A tolerance of 10% per unit is allowed. (For example, a bomb weighing 550 lbs. may be considered as coming within the 500 lb. group.) 13. Naval mines, uncrated and fitted with lifting eye shall be loaded by using wire rope and shackle. 14. Naval mines, uncrated and not fitted with lifting eye may be loaded by use of wire rope slings or trays fitted with sideboards. 15. The following items when boxed or crated shall be loaded by the use of pallet, skipboard or tray fitted with cargo net or sideboards, photoflash bombs, antitank mines, antipersonnel mines, naval mines, warheads, depth charges, torpedo bangalore, projector charges and rocket heads

				Warheads, depth bombs, depth charges, Naval mines, and like items are in the "Container-dent sensitivity" category. All of the foregoing also apply in substantial effect to containers of this class of ammunition that are not thin walled.	with any other military explosive, including items of this class the two stowages must be separated by a partition bulkhead or a type "A" dunnage floor. For stowage adjacent to other dangerous articles see § 146.29–59.	16. Warheads, crated in such a manner that the nose lifting ring is exposed may be loaded by means of said ring. 17. The maximum permitted weight per draft, when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 18. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 19. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 20. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
X–B						
Explosive bombs, mines, torpedoes, etc., packed with fuzes in integral package. (Fuzes will not detonate items with which packaged nor adjacent packages.)	Bombs, bomb clusters, mines, depth charges, warheads (fuzed and unfuzed), projector charges (unfuzed and without motors), torpedo bangalore (unfuzed), and other unfuzed ammunition filled with relatively large amounts of HE; all possessing a similar hazard characteristic of en masse detonation. The fuze is packed integral with the item, but the fuze will not detonate the item with which packaged nor adjacent packages. Includes but is not limited to: Bombs: Armor-piercing. Demolition. Depth. Depth charge. Fragmentation. G. P. Photoflash (except M–122). S. A. P. Shallow water depth. Mines: Aerial. Aircraft.	"Explosive bombs." "Explosive mines." "Explosive projectiles." "Explosive torpedoes."	A A A A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of their tendency to detonate en masse if involved in a fire or subjected to shock. Detonation will result in severe structural damage, increasing in severity and range in relation to the amount of high explosives involved. All high explosive loaded items in this class having thin container walls are relatively easily ruptured or dented	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Class XB items shall not be stowed in the same hold or compartment with Class I items unless the two classes are separated by a partition bulkhead or a type "A" dunnage floor. Items in this class having thin container walls and said to possess "container-dent sensitivity" shall not be tiered one layer on top of another unless they	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skipboard, or tray, or as a preventor or save-all. 5. Bombs, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powdered roller conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Unboxed or uncrated warheads, depth bombs, depth charges, or other thin walled items shall not be tiered in "making up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition.

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CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
	Anti-personnel (unfuzed). Anti-personnel fragmentation (unfuzed). Anti-tank (unfuzed). Anti-tank non-metallic (unfuzed). Grenade. High explosive. Land. Nuclear weapons (see para. 21 under "Handling"). Signals, underwater sound, w/fuze. Torpedo bangalore. Torpedo warheads.			Denting of the container walls by impacts, though not sufficiently severe to rupture them has occasionally resulted in partial or complete detonation, and such kind of ammunition is said to possess "container-dent sensitivity". A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact apparently causes instantaneous explosive action. But whatever may be the actual mechanics of this phenomenon, the kinds of impacts known to have caused explosion of these items include such impacts as dropping on or striking against a rounded corner, similar to a hatch coaming, impact of one bomb against another, or being struck by handling and transportation equipment.	are boxed, crated or dunnaged in such a manner that they are properly protected to withstand the superimposed weight. Items having thin walls and possessing "container-dent sensitivity" may be overstowed only with very light cargo such as bomb fin assemblies, empty water fillable practice bombs and empty auxiliary gas tanks. Items of the class having thick walled containers may be tiered one layer on top of another provided they are so stowed, dunnaged, blocked and/or braced as to prevent movement that is likely to damage the ammunition, the vessel or other cargo. Shall not be overstowed with inert compatible cargo having lesser bearing surface or greater unit weight than any item stowed below. Except for wooden	8. Depth charges and rocket heads that are not boxed or crated shall be loaded by use of pallet, skipboard or tray fitted with cargo net or sideboards. 9. Bombs, except depth bombs, may be loaded by use of wire rope slings, or by pallet, skipboard or tray fitted with cargo net or sideboards. 10. Depth bombs shall be loaded only by using pallet, skipboard, or tray fitted with cargo net or sideboards. (See § 146.29–39). 11. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 12. Single slings made up in multiple assembly with spreader may be used in handling bombs that do not exceed 1,101 pounds each. Two legged slings shall be used in handling bombs of more than 1,101 pounds each. (See table of Limiting Loads, Class X-A). 13. Naval mines, uncrated and fitted with lifting eye shall be loaded by using wire rope and shackle. 14. Naval mines, uncrated and not fitted with lifting eye may be loaded by use of wire rope slings or trays fitted with sideboards. 15. The following items when boxed or crated shall be loaded by the use of pallet, skipboard or tray fitted with cargo net or sideboards; photoflash bombs, antitank mines, antipersonnel mines, naval mines, warheads, depth charges, torpedo bangalore, projector charges and rocket heads. 16. Warheads, crated in such a manner that the nose lifting ring is exposed may be loaded by means of said ring

				In placing or removing dunnage, an accidental or misdirected blow from a sledge hammer, pinch bar or other hand tool may cause such explosions. The impact need not be violent. A short drop of only 2 feet caused a low order detonation of a depth bomb. Warheads, depth bombs, depth charges, Naval mines, and like items are in the "Container-dent sensitivity" category. All of the foregoing also apply in substantial effect to containers of this class of ammunition that are not thin walled.	barrels or boxes and fiberboard containers no flammable or combustible material as cargo or containers of same shall be stowed in a hold in which this class of ammunition is stowed. When photoflash items of this class are stowed with any other military explosive, including other items of this class, the two stowages must be separated by a partition bulkhead or type "A" dunnage floor. For stowage adjacent to other dangerous articles see § 146.29-59.	17. The maximum permitted weight per draft, when handled by pallet, skipboard, tray of pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 18. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 19. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 20. The limiting weights noted above are for a 5-ton boom. See § 146.29-41. 21. Nuclear weapons, warheads, and their components shall be handled and transported in accordance with pertinent military service directives.
X-C						
Guided missiles, solid propellant motors, packed with or without HE warheads.	Completely assembled missiles or rockets with DOT Class A and Class B solid fuel motors. Projector charges. Rocket motors, Class A.	"Rocket ammunition with explosive projectiles." Jato units, Class A. Jet, thrust units, Class A.	A or B A A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of (1) their tendency to detonate en masse if involved in a fire or subjected to shock, and (2) the combustibility and toxicity of the fuel if involved in a fire.	*AMMUNITION STOWAGE OR PORTABLE MAGAZINE* Class XC items shall not be stowed in the same hold or compartment with Classes II-B, IV, and VII items unless the two classes are separated by a partition bulkhead or	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skipboard, or tray, or as a preventor or save-all. 5. Missiles, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powered roller

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
				All high explosive loaded items of this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impact, though not sufficiently severe to rupture them may result in a partial or complete detonation. A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact causes instantaneous explosive action. These kinds of impacts are striking against a rounded corner similar to a hatch coaming, impact of one missile against another, or being struck by handling or transportation equipment. Toxicity by inhalation of fumes is increased when fuels are ignited as the intensity of poisonous fumes is increased.	a type "A" dunnage floor. Except for wooden boxes or barrels and fiberboard containers, no flammable or combustible material shall be stowed in a hold or compartment in which this class of ammunition is stowed. Shall not be overstowed with any other kind of cargo. May be stowed on deck protected, except on the square of a hatch. For stowage adjacent to other dangerous articles see § 146.29–59.	conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Unboxed or uncrated missiles shall not be tiered in "making up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition. 8. May be loaded by use of wire rope slings, or by pallet, skipboard or tray fitted with cargo net or sideboards. 9. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 10. Single slings made up in multiple assembly with spreader may be used in handling missiles that do not exceed 1,101 pounds each. Two legged slings shall be used in handling missiles of more than 1,101 pounds each. (See table of Limiting Loads, Class X–A). 11. The maximum permitted weight per draft, when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 12. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 13. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

				Care should be exercised to minimize the exposure of personnel to the toxic effects of these mixtures and to prevent damage to the container with resulting leakage or spillage.		
X–D						
Guided missiles, liquid propellant motors, packed with HE warheads.	Completely assembled missiles or rockets with liquid petroleum fueled motors.	"Rocket ammunition with explosive projectiles."	A	Fire and shock are the primary hazards to this class of ammunition. They are particularly dangerous because of (1) their tendency to detonate en masse if involved in a fire or subjected to shock, and (2) the combustibility and toxicity of the fuel if involved in a fire. All high explosive loaded items of this class having thin container walls are relatively easily ruptured or dented. Denting of the container walls by impact, though not sufficiently severe to rupture them may result in a partial or complete detonation. A certain degree of confinement combined with local heating of the contained explosive by a particular kind of impact causes	*AMMUNITION STOWAGE* Class X–D items shall not be stowed in the same hold or compartment with other military explosives, other dangerous cargo, or regulated items. Shall be stowed only in a lower hold, or "On deck protected," not on the square of a hatch. Shall not be overstowed. For stowage adjacent to other dangerous articles see § 146.29–59. Must be stowed so that superstructure intervenes between it and other items that require "On deck" stowage. Preferred "On deck" stowage is aft. Missiles with liquid petroleum fueled motors may be stowed at any level	1. Handle by hand or mechanical means. 2. Do not drop, drag, slide, tumble, walk or otherwise subject these articles to shock. 3. Do not use chute in loading or unloading. 4. Cargo nets shall not be used except to enclose a pallet, skipboard, or tray, or as a preventor or save-all. 5. Missiles, not crated or boxed, without external fittings or with external fittings protected by lug guards, may be rolled only under continuous hand control on level surfaces or on non-powered roller conveyors, provided these surfaces or conveyors are relatively level and free from projections. 6. Unboxed or uncrated missiles shall not be tiered in "making up" drafts (hoists). 7. No "cant" or barrel hooks shall be used on this class of ammunition. 8. May be loaded by use of wire rope slings, or by pallet, skipboard or tray fitted with cargo net or sideboards. 9. Slings for use in hoisting this class of ammunition must be approved for use by the Captain of the Port. 10. Single slings made up in multiple assembly with spreader may be used in handling missiles that do not exceed 1,101 pounds each. Two legged slings shall be used in handling missiles of more than 1,101 pounds each. (See table of Limiting Loads, Class X–A).

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
				instantaneous explosive action. These kinds of impacts are, striking against a rounded corner, similar to a hatch coaming, impact of one missile against another, or being struck by handling or transportation equipment. Toxicity by inhalation of fumes is increased when fuels are ignited as the intensity of poisonous fumes is increased. Care should be exercised to minimize the exposure of personnel to the toxic effects of these mixtures and to prevent damage to the container with resulting leakage or spillage.	in any hatch provided leakage of the fuel will drain directly into the bilges.	11. The maximum permitted weight per draft, when handled by pallet, skipboard, tray or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 12. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 13. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 14. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
X-E Rocket engines, liquid.	Rocket engines containing a liquid propellant, a hypergolic fuel-oxidizer combination which is shipped separately packaged within the rocket engine. The igniter booster is also shipped as an integral part of the rocket engine. Includes but is not limited to: Bullpup rocket engine.	Rocket engines (liquid), Class B explosives.	B	Fire can cause the engines to liberate dangerous toxic gases. Such gases (or smoke) are dangerous if allowed	"On deck protected." Class X-E items shall not be stowed in the same hold or compartment with other military	1. Observe containers for evidence of leakage and reject any showing such signs. 2. Handle by hand or mechanical means using extreme care against damage to the container.

to become airborne contaminators, or to be ingested or inhaled into the body. Use copious amounts of water to combat fires or leakers. Fire extinguishers containing carbon dioxide, carbon tetrachloride, or dry powder should not be used. Normal fire-fighting equipment is less useful, since the blanketing or smothering is less effective because the oxidizers supply their own oxygen. In case of fire, or if leaky containers are discovered, personnel should use protective clothing.	explosives. Ammunition stowage in a lower hold or deep tank if the space is equipped with a sprinkler system. Shipments stowed on deck shall be last-on/first-off shipments on board the vessel. Shipments stowed on deck shall be last-on/first-off shipments on board the vessel. On vessels having the bridge structure amidship, the holds separated by the bridge structure from the Class X-E explosives stowage may be worked. Adequate firehose, adjacent to the stowage area, shall be readily accessible to ship's personnel. The on deck stowage shall be isolated from other deck cargo. It shall be separated from other military explosives, hazardous munitions or dangerous cargoes on deck by the bridge structure. Stowage on deck shall not be over the square of the hatch.	3. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 4. Packages shall be stowed in the position indicated by their markings. 5. Do not use chute in loading or unloading. 6. In the event of damage to a container resulting in leakage or spillage, stop operations, clear area of all personnel, render first aid to personnel affected and spray copious amount of water on area affected. Decontamination must be handled by personnel trained in this procedure and equipped with protective clothing and self-contained breathing apparatus. 7. Four complete sets of acid-resistant protective clothing, including a self-contained breathing apparatus of an approved type, must always be immediately available for emergency use. In this operation, as well as all other operations involving fuming nitric acid, treadle type of deluge showers and a container of approximately 5% solution of acetic acid or strong vinegar must be available. 8. Weight per draft shall not exceed 2,400 pounds plus 10% using a five-ton boom. Single items of this class, or assembled units designed to be handled as a unit, may be loaded regardless of weight provided the cargo handling gear is of a design capable of handling a working load at least 50 percent additional to the actual weight of the item or unit comprising the draft and provided further the integrity of the cargo handling gear is unimpaired. 9. Must be loaded first on the side away from the pier so that motors being loaded do not pass over those already loaded.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
XI–A Chemical ammunition, lethal.	Chemical ammunition filled with lethal gases such as mustard gas (H), lewisite gas (L), nerve gas (GB and VX), BW agents, phosgene gas (CG), hydrocyanic acid (AC), nitrogen mustard gas (HN), diphosgene (DP), chlorpicrin gas (PS), cyanogen chloride (CK) when shipped assembled with or without their ignition elements, bursting charges or fuzes. When these substances are shipped in drums, barrels, cylinders or other authorized containers they shall be classified Class A, Poison Gas. When these substances are shipped in authorized DOT specification containers or Army Materiel Command specification containers of integrity equal to DOT containers (including projectiles, bombs and rockets without ignition elements, bursting charges or fuzes) they may be handled and stowed either as Class A poison gas or chemical ammunition Class XI–A. Includes but is not limited to the following items when filled with any of the above agents: Ammunition for guns with gas projectile. Bombs, chemical. Bombs, clusters, chemical. Frangible grenade. Hand grenade. Howitzer projectile. Land mine. Mortar projectile. Rockets, chemical. Separate loading projectile. NOTE: The Army Materiel Command or U.S. Navy, when shipping chemical ammunition, mark such ammunition and the containers thereof, in general, as follows: (a) By the use of color bands painted upon the ammunition the containers thereof; by letter symbol to indicate the particular kind of chemical	"Ammunition for cannon with gas projectile." "Explosive bomb." "Explosive projectile." "Explosive mine." "Hand grenade." "Rifle grenade." "Rocket ammunition with gas projectile." Shipping name of item when shipped as Class A poison.	A A A A A A A Pois. A	This type of ammunition or bulk shipments of these substances in containers other than ammunition, represents a particular and special hazard. Minute quantities of either liquid or vapor can cause serious burns and death. The liquid or vapor will contaminate everything with which it comes in contact, cause serious and painful burns to exposed portions of the body and the eyes, and attack the respiratory system usually with fatal results. Nerve gas is highly toxic, quick acting nerve poison. It can be absorbed through any body surface including the respiratory tract, skin, eyes, and gastrointestinal tract. The rapidity of action of nerve gas and absence of identifying symptoms may incapacitate a	*CHEMICAL AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE* Bulk shipments of chemical agents in DOT cylinders, tanks or Army Materiel Command specification containers of integrity equal to DOT containers may be stowed in a shelter deck space or in a deck house suitable for such stowage. Chemical ammunition (explosive) shall be stowed in a deep tank, lower hold or between deck, and such stowage shall be effectively sealed off to prevent the escape of any leakage which may take place. (See § 146.29–85.) Drums or other authorized DOT or Army Materiel Command specification	When possible and the amount of such ammunition or containers of these chemical substances warrants, a technical representative of the appropriate Department of Defense technical service shall be present during the loading and stowage. 1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Packages shall be braced so as to prevent any movement. Top tiers shall be braced to prevent upward movement. 6. Packages or containers shall be stowed in the position indicated by their markings. When not so marked, boxes shall be stowed on the most stable side and arranged in such a manner that the joints between boxes are staggered. 7. No packages shall be "cant" stowed. 8. Dunnage shall be applied to the sides, ends and tops of the boxes before bracing is applied. 9. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 10. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with this class of chemical warfare material.

		therein and the word "Gas" stenciled upon the ammunition of the containers thereof. (b) Persistent gases are marked with two (2) green bands. Nonpersistent gases with one (1) green band. (c) The word "Gas" will be stenciled upon projectiles and upon the outside container of projectiles, grenades, bombs, candles, etc., the stenciling to be of the same color as the designating band. (d) The bodies of all ammunition containing gas will be painted gray.			person so rapidly that he may be unable to take individual protective measures.	containers filled with Class A poison gas may be stowed in the same hold or compartment with chemical ammunition Class XI–A. For stowage adjacent to other dangerous articles see § 146.29–59. May be loaded at a temporary location authorized by the Captain of the Port for the specific loading. When given chemical ammunition stowage, see § 146.29–85 for additional requirements.	12. The maximum permitted weight per draft when handled by tray, skipboard, pallet, or pieplate fitted with cargo net or sideboard; shall not exceed 2,400 lbs. plus 10%. 13. Single bombs or other unit containers weighing in excess of 2,200 lbs. must be loaded or unloaded one at a time. 14. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 15. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 16. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.
XI–B	Chemical ammunition, nonlethal.	Chemical ammunition filled with non-lethal gases such as Chloracetophenone gas (CN), Chloracetophenone solution (CNB) or (CNS), Brombenzylcyanide (BBC) and Adamsite (DM) when shipped assembled with or without their ignition elements, bursting charges or fuzes. When these substances are shipped in drums, barrels, cylinders or other authorized containers, they shall be classified as tear gasses or irritating substances, Class C—poisons. When these substances are shipped in authorized DOT specification containers or Army Materiel Command containers of integrity equal to DOT containers (including projectiles, bombs and rockets, without ignition elements, bursting charges or fuzes) they may be handled and stowed either as Class C—poisons or as chemical ammunition Class XI–B. Includes but is not limited to the following items when filled with any of the above agents: Ammunition for cannon with gas projectile. Bombs, aircraft. Bombs, aircraft cluster. CN capsules. Gas identification sets.	"Ammunition for cannon with gas projectile." "Explosive bomb." "Explosive projectile." "Hand grenade." "Rifle grenade." "Tear gas candle." "Tear gas grenade." "Rocket ammunition with gas projectile." Shipping name of item when shipped as Class C poison.	A A A A A Pois. C Pois. C A Pois. C	Fire and intolerable vapors. The fire hazard of some of these items is similar to that of smokeless powder. The vapors are rarely lethal as concentrations far below the lethal range are intolerable. Gas mask provides complete protection.	*CHEMICAL AMMUNITION STOWAGE, SPECIAL STOWAGE, OR PORTABLE MAGAZINE* It is important to stow in locations not subject to temperatures above 150° F. Stowage shall be accessible from cargo hatch or other access means to the hold or compartment. Drums or other authorized DOT or Army Materiel Command specifications containers filled with	When possible and the amount of such ammunition or containers of these chemical substances warrants, the loading and stowage of chemical ammunition or chemical agents for such should be supervised by a representative of the appropriate Department of Defense technical service. 1. Handle by hand or mechanical means. 2. Do not drop, drag, tumble, walk or otherwise subject packages to shock. 3. Do not use chute in loading or unloading. 4. Shall not be rolled except under hand control and on a level surface without appreciable incline. 5. Packages shall be braced so as to prevent any movement. Top tiers shall be braced to prevent upward movement. 6. Packages or containers shall be stowed in the position indicated by their markings. When not so marked, boxes shall be stowed on the most stable side and arranged in such a manner that the joints between boxes are staggered.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
	Grenades, hand. Grenades, frangible, hand. Grenades, rifle. Rockets. Projectiles, mortar. Tear gas candles. Tear gas posts. NOTE: The U.S. Army and Navy when shipping harassing gas ammunition, mark such ammunition and the containers thereof with the word "gas" and Army Materiel Command symbol of the gas with one red band.				Class C poison gas may be stowed in the same hold or compartment with chemical ammunition, Class XI–B. For stowage adjacent to other dangerous articles see § 146.29–59. May be loaded at a temporary location authorized by the Captain of the Port for the specific loading. When given chemical ammunition stowage, see § 146.29–85 for additional requirements.	7. No packages shall be "cant" stowed. 8. Dunnage shall be applied to the sides, ends and tops of the boxes before bracing is applied. 9. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with removable sides are authorized. 10. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 11. Wire rope slings are permitted when handling unboxed bombs or containers filled with this class of chemical warfare material. 12. The maximum permitted weight per draft when handled by tray, skipboard, pallet or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 13. Single bombs or other unit containers weighing in excess of 2,200 lbs. must be loaded or unloaded one at a time. 14. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 15. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 16. The limiting weights noted above are for a 5-ton boom. See § 146.29–41.

XI-C	*Fuels in containers for guided missiles and rockets.*	*Missile fuels are usually non-corrosive, highly combustible mixtures, shipped in drums of aluminum or glass containers, used as fuels for guided missiles or rockets.* Includes but is not limited to: Acetonitrile (methyl cyanide). Aluminum borohydride. Anhydrous ammonia. Aniline. Diborane. Diethylene triamine. Diethylene glycol dinitrate, liquid. Dimethyl hydrazine, unsymmetrical. Ethyl alcohol. Furfuryl alcohol. Gasoline (AVGAS). Heptane. Hydrazine. Hydrazine hydrate. Kerosene. Liquid fluorine. Liquid hydrogen. Methyl alcohol. Monoethylaniline. Nitroglycenne, liquid Nitromethane Octane. Pentaborane. Pentane. Potassium cuprocyanide. Tetranitromethane.	Shipping name of item.	F. G. F. L. F. S. Oxy. M Nonf. G Pois. B	The principal hazard is its involvement in a fire since all of the fuels are highly combustible and toxic and under certain conditions will explode. Aniline-furfuryl alcohol mixtures are toxic through inhalation of the fumes or vapors, ingestion, and absorption through the skin. Toxicity by inhalation of fumes is increased when fuels are ignited as the intensity of poisonous fumes is increased. Care should be exercised to minimize the exposure of personnel to the toxic effects of these mixtures and to prevent damage to the containers with resulting leakage or spillage.	This class will *not* be stowed with any corrosive liquid (acids, etc.), oxidizing agents, or explosives. For stowage adjacent to other dangerous articles see § 146.29–59. May be stowed "On deck" and protected from direct rays of the sun and inclement weather, or may be stowed in a deep tank and such stowage shall be effectively sealed off to prevent the escape of any leakage which may take place. Pertinent parts of § 146.29–85 apply. Compatibility of items within this class shall be in accordance with § 146.29–99, Chart B. Must be stowed so that superstructure intervenes between it and other items that require "On deck" stowage. This requirement also applies to non-compatible items within this class. Preferred "On deck" stowage is aft. Drums may be tiered 2-high by use of	When possible, and the amount of substance warrants, the loading and stowage of fuels should be supervised by a representative of the appropriate Department of Defense technical service. 1. Handle by hand or mechanical means using extreme care against damage to the container resulting in leakage or spillage. 2. Do not drop, drag, tumble, walk or otherwise subject packages or drums to shock. Drums will *not* be rolled. 3. Packages shall be stowed in the position indicated by their markings; drums and kegs shall be stowed on end with bung holes up. 4. Do not use chute in loading or unloading. 5. Observe packages or drums for leakage or spillage, and for odor of aniline or alcohol in the case of aniline-furfuryl alcohol shipments. If no odor is present and no evidence of leakage is present, the shipment is assumed to be in safe working condition and the cargo can be handled by personnel wearing the usual type of leather gloves and safety shoes. No other type of protective clothing will be required; however, in this operation as well as all other operations involving aniline-furfuryl alcohol mixtures, treadle type of deluge shower and a container of approximately 5% solution of acetic acid or strong vinegar must be available. 6. In the event of damage to a container resulting in leakage or spillage, stop operations, clear area of all personnel, render first-aid to personnel affected and spray copious amount of water on area affected. Decontamination must be handled with a minimum delay by personnel trained in this procedure and equipped with protective clothing and self-contained breathing apparatus.

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
					metal dunnage of aluminum. When stowed on deck, the weather deck must be tight and the cargo hatch fitted with a tight raised coaming. The stowage must be accomplished by means of a crib and a platform so constructed as to provide a free space of at least six inches in height between the deck and the floor of the crib in such a manner as to allow flushing of any leakage that may occur. The stowage must not be made over the square of hatch. If stowed aboard a vessel carrying no other military explosives, see § 146.29-11(b).	7. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays with fixed or removable sides are authorized. 8. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 10. The maximum permitted weight per draft, when handled by pallet, skipboard, tray or pieplate fitted with cargo nets or sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.
XI-D Oxidizers in containers for guided missiles and rockets.	Oxidizers for use with guided missiles and rockets are non-flammable liquids; however, they are strong oxidizers and if allowed to come in contact with readily organic materials or metallic powders, may cause spontaneous combustion. They are highly toxic producing poisonous vapors and fumes and capable of producing severe burns or death if improperly handled. Fuming nitric acid vigorously attacks most metals, particularly iron and steel.	Shipping name of item.	Cor. L. Nonf. G. Oxy. M.	The principal hazards arise from the combustibility of organic materials when in contact with acids and the toxicity of fumes and vapors produced. The oxides of nitrogen, referred to as	This class will *not* be stowed with any inflammable liquid fuels, metallic powders, or explosives. For stowage adjacent to other dangerous articles see § 146.29-69.	When possible, and the amount of substance warrants, the loading and stowage of oxidizers and acids should be supervised by a representative of the appropriate Department of Defense technical service. 1. Handle by hand or mechanical means using extreme care against damage to the container resulting in leakage or spillage.

Includes but is not limited to: Compressed gas, oxygen. Hydrogen peroxide. Liquid nitrogen tetroxide. Liquid oxygen. Mixed acid (nitric-sulfuric). Red nitric acid, fuming. White nitric acid, fuming.	"nitrous fumes" if inhaled in appreciable quantities, may cause severe damage to respiratory and pulmonary tissues and, under certain conditions, may result in death. Color of the fumes is *not* an index to their toxicity. *All* nitric acid fumes are dangerous. Contact with the skin results in severe burns and may result in permanent scars or deformity. Contact with the eyes may cause blindness. Red Fuming Nitric Acid (RFNA) is not flammable in itself and cannot be detonated, but the combustibility of all organic material is greatly increased in contact with this acid. This acid is very hygroscopic (completely soluble), and its introduction *INTO* water will cause rapid evolution of heat with spattering of the acid. RFNA vigorously attacks most metals, particularly iron and steel. Nitric acid will react with salt water to	May be stowed "On deck" and protected from direct rays of the sun and inclement weather, or may be stowed in a deep tank and such stowage shall be effectively sealed off to prevent the escape of any leakage which may take place. Pertinent parts of § 146.29–85 apply. Compatibility of items within this class shall be in accordance with § 146.29–99, Chart B. Must be stowed so that superstructure intervenes between it and other items that require "On deck" stowage. This requirement also applies to non-compatible items within this class. Preferred "On deck" stowage is aft. Drums may be tiered 2-high by use of metal dunnage of aluminum. When stowed on deck, the weather deck must be tight and the cargo hatch fitted with a tight raised coaming. The stowage must be accomplished as to provide a free space of at least six inches in height between the deck and the	2. Do not drop, drag, tumble, walk, or otherwise subject packages or drums to shock. Drums will not be rolled. 3. Packages shall be stowed in the position indicated by their markings; drums and kegs shall be stowed on end with bung holes up. 4. Do not use chute in loading or unloading. 5. Visually inspect packages or drums for evidence of spillage or leakage and for odor of nitrous dioxide, fumes in the case of fuming nitric acid shipments. If no odor is detected and no fumes are visible, the shipment is assumed to be in safe working condition and the cargo can be handled by personnel wearing gloves and aprons of acid-resistant material, safety shoes and eye goggles. No other type of protective clothing will be required; however, two complete sets of acid-resistant protective clothing, including a self-contained breathing apparatus, of an approved type, must always be immediately available for emergency use. In this operation, as well as all other operations involving fuming nitric acid, treadle type of deluge showers and a container of approximately 5% solution of acetic acid or strong vinegar must be available. 6. In the event of damage to a container resulting in leakage, spillage or fumes, stop operations, clear area of all personnel, render first-aid to personnel affected and spray copious amount of water on area affected. Decontamination must be handled with a minimum delay by personnel trained in this procedure and equipped with approved type of protective clothing and self-contained breathing apparatus. Damaged containers will be removed only by such personnel. 7. Cargo handling stevedore gear may be trays, skipboards, pallets, or pieplates provided they are fitted with cargo nets or sideboards. Boxes or trays fitted with fixed or removable sides are authorized

CLASSIFICATION, HANDLING AND STOWAGE CHART—Continued

Class	Description	DOT marking	DOT class	Hazard	Stowage	Handling
				liberate chlorine and other poisonous gases. Winterized water fire extinguishers containing salt as a freezing point depressant, should not be used to fight fires involving nitric acid. The use of large quantities of water, as a spray rather than a stream, to dilute the acid and extinguish the fire, is effective. Fire extinguishers of a suitable type should be provided wherever this acid is handled or stowed.	floor of the crib in such a manner as to allow flushing of any leakage that may occur. The stowage must not be made over the square of the hatch. If stowed aboard a vessel carrying no other military explosives, see § 146.29-11(b).	8. Cargo nets without trays, skipboards, pallets or pieplates are not permitted. 9. Lifts of palletized units shall not be tiered except when using a sling so designed as to prevent, by means of sideboards or netting extended upward to the uppermost height of the draft, the upper tier or tiers from shifting or falling from the draft. 10. The maximum permitted weight per draft, when handled by pallet, skipboard, tray, or pieplate fitted with cargo net or sideboards shall not exceed 2,400 lbs. plus 10%. 11. Drafts consisting of one or more palletized units shall not exceed 4,000 lbs. plus 10%. 12. The limiting weights noted above are for a 5-ton boom. See § 146.29-41.

[CGFR 62-11, 27 FR 5287, June 5, 1962]

EDITORIAL NOTE: For Federal Register citations affecting this table see the List of CFR Sections Affected in the Finding Aids section of this volume.

PART 147—HAZARDOUS SHIPS' STORES

Subpart A—General Provisions

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147.3 Definitions.
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147.70 Acetylene.
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147.90 Refrigerants.
147.95 Explosives.
147.100 Radioactive materials.
147.105 Anesthetics, drugs, and medicines.

AUTHORITY: 46 U.S.C. 3306; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; 49 CFR 1.46.

SOURCE: CGD 84-044, 53 FR 7749, Mar. 10, 1988, unless otherwise noted.

Subpart A—General Provisions

§ 147.1 Purpose and applicability.

(a) This part prescribes regulations designating what hazardous materials may be on board vessels as ships' stores and prescribes requirements for the labeling, stowage, and use of those materials.

(b) This part applies to all vessels listed in 46 U.S.C. 3301 as subject to inspection under part B of 46 U.S.C. Subtitle II. On foreign vessels in the navigable waters of the United States, the Captain of the Port or District Commander may prohibit the unsafe use or stowage of hazardous ships' stores under 33 CFR 160.109.

(c) All certifications previously issued by the Coast Guard under this part permitting the use of particular materials or products as ships' stores are null and void.

§ 147.3 Definitions.

As used in this part:

Accommodation, control, or service spaces means living quarters, including walkways, dining rooms, galleys, pantries, lounges, lavatories, cabins, staterooms, offices, hospitals, cinemas, and game and hobby rooms; areas containing controls for equipment and navigation; workshops, other than those forming part of machinery spaces; and store rooms adjacent to these spaces.

Combustible liquid means *combustible liquid* as the term is defined in 49 CFR 173.115(b).

Compressed gas means *compressed gas* as the term is defined in 49 CFR 173.300.

Consumer commodity means a commodity, such as a polish, insecticide, cleaning compound, or distillate, that is packaged and distributed in a form and quantity intended for sale through retail sales establishments.

Flammable liquid means *flammable liquid* as the term is defined in 49 CFR 173.115(a).

Hazardous material means *hazardous material* as the term is defined in 49 CFR 171.8.

Hazardous ships' stores means ships' stores that are hazardous materials.

Proper shipping name means the name of the hazardous ships' stores shown in Roman print (not in italics) in 49 CFR 172.101.

Ships' stores means materials which are on board a vessel for the upkeep, maintenance, safety, operation, or navigation of the vessel (except for fumigants under part 147A of this chapter, for fuel and compressed air used for the vessel's primary propulsion machinery, or for fixed auxiliary equipment) or for the safety or comfort of the vessel's passengers or crew.

Technical name means the recognized chemical name used in scientific or technical publications.

§ 147.5 Commandant (G-MTH); address.

Commandant (G-MTH) is the Marine Technical and Hazardous Materials Division of the Coast Guard Office of Marine Safety, Security and Environmental Protection. The address is Commandant (G-MTH-1), U.S. Coast Guard Headquarters, Washington, DC 20593-0001, and the telephone number is (202) 267-1577.

§ 147.7 Incorporation by reference.

(a) In this part, portions or the entire text of certain standards and specifications are incorporated by reference as the governing requirements for materials, equipment, tests, or procedures to be followed. These standards and specification requirements specifically referred to in this part are the governing requirements for the subject matters covered, unless specifically limited, modified, or replaced by the regulations.

(b) These materials are incorporated by reference into this part under 5 U.S.C. 552(a) with the approval of the Director of the Federal Register. The Office of the Federal Register publishes a table, "Material Approved for Incorporation by Reference," which appears in the Finding Aids section of this volume. To enforce any edition other than the one listed in paragraph (c) of this section, notice of the change must be published in the FEDERAL REGISTER and the material made available. All approved material is on file at the Office of the Federal Register Information Center, Room 8301, 1100 L Street, NW., Washington, DC 20408 and at U.S. Coast Guard Headquarters, 2100 Second Street, SW., Washington, DC 20593-0001. Copies may be obtained from the sources indicated in paragraph (c) of this section.

(c) The materials approved for incorporation by reference in this part are:

American Boat and Yacht Council, Inc. (ABYC), P.O. Box 806, Amityville, NY 11701
  ABYC H-25-81—Portable Fuel Systems and Portable Containers for Flammable Liquids, May 12, 1981.
American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), Publication Sales Department, 1791 Tullie Circle, NE, Atlanta, GA 30329
  ANSI/ASHRAE 34-78—Number Designation of Refrigerants, approved 1978.
Public Health Service, Department of Health and Human Services (DHHS),
  Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
  DHHS Publication No. (PHS) 84-2024—The Ship's Medicine Chest and Medical Aid at Sea, revised 1984.
Underwriters Laboratories, Inc. (UL), Publications Stock, 333 Pfingsten Road, Northbrook, IL 60062
  UL 30—Standard for Metal Safety Cans, 7th Ed., March 11, 1985, revised March 12, 1985 and March 3, 1987.
  UL 1185—Standard for Portable Marine Fuel Tanks, Second Edition, March 13, 1978, revised July 6, 1984.
  UL 1313—Standard for Nonmetallic Safety Cans for Petroleum Products, 1st Ed., March 15, 1982, revised January 3, 1984 and March 22, 1985.
  UL 1314—Standard for Special-Purpose Containers, 1st Ed., July 7, 1983, revised February 7, 1984 and September 23, 1986.

§ 147.8 OMB control numbers assigned pursuant to the Paperwork Reduction Act.

(a) *Purpose.* This section collects and displays the control numbers assigned to information collection and recordkeeping requirements in this subchapter by the Office of Management and Budget (OMB) pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). The Coast Guard intends that this section comply with the requirements of 44 U.S.C. 3507(f), which requires that agencies display a current control number assigned by the Director of the OMB for each approved agency information collection requirement.

(b) *Display.*

46 CFR part or section where identified or described	Current OMB control no
§ 147.9	2115–0139
§ 147.30	2115–0139
§ 147.40	2115–0139
§ 147.60(c)(2)	2115–0139

[CGD 88-072, 53 FR 34298, Sept. 6, 1988; 88-072, 53 FR 37570, Sept. 27, 1988]

§ 147.9 Waivers.

(a) Any requirement in this part may be waived on a case by case basis if it is determined by Commandant (G-MTH) that the requirement is impracticable under the circumstances and that an acceptable level of safety can be maintained.

(b) Requests for issuance of a waiver must be in writing and contain a detailed explanation of—

(1) Why the requirement is impracticable; and

(2) What measures will be taken to maintain an acceptable or equivalent level of safety.

§ 147.15 Hazardous ships' stores permitted on board vessels.

Unless prohibited under subpart B of this part, any hazardous material may be on board a vessel as ships' stores if the material—

(a) Is labeled according to § 147.30; and

(b) Meets the requirements, if any, in subpart B of this part applicable to the material.

§ 147.30 Labeling.

(a) Except as provided in paragraph (b) of this section, all immediate receptacles, containers, or packages containing hazardous ships' stores must be labeled in English with the following information concerning the contents:

(1) Technical name or proper shipping name.

(2) For hazardous ships' stores other than liquid fuels, manufacturer's or supplier's name and address.

(3) Hazard classification under 49 CFR 172.101 and 173.2.

(4) For hazardous ships' stores other than liquid fuels, step by step procedures for proper use.

(5) First aid instructions in the event of personnel contact, including antidotes in the event of ingestion.

(6) Stowage and segregation requirements.

(b) Hazardous ships' stores that are consumer commodities labeled in accordance with the Federal Hazardous Substances Act Regulations in 16 CFR Part 1500 need not be labeled as specified in paragraph (a) of this section.

Subpart B—Stowage and Other Special Requirements for Particular Materials

§ 147.33 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989; 55 FR 21386, May 24, 1990]

§ 147.35 Purpose of subpart.

This subpart prescribes special requirements applicable to particular, named materials. These requirements are in addition to the general requirements in subpart A applicable to those materials.

§ 147.40 Materials requiring Commandant (G-MTH) approval.

(a) Commandant (G-MTH) approval is required before the following hazardous materials may be on board a vessel as ships' stores:

(1) Class A poisons.

(2) Class A explosives.

(3) Flammable gases, other than those addressed specifically in this subpart.

(4) Forbidden materials listed in 49 CFR 172.101.

(b) Request for approval must be submitted to the Commandant (G-MTH), identify the material, and explain the need for its use.

(c) Upon approval, the material is added to the list of materials approved under this section. A copy of this list is available from the Commandant (G-MTH) at the address in § 147.5.

§ 147.45 Flammable and combustible liquids.

(a) This section applies to the stowage and transfer of flammable and combustible liquids (including gasoline and diesel oil), other than liquids used as fuel for cooking, heating, and lighting under § 147.50.

(b) No flammable or combustible liquids may be stowed in any accommodation, control, or service space (other than a paint locker).

(c) No more than 19 liters (five gallons) of flammable liquids may be stowed in any machinery space. The flammable liquids must be in containers of 3.8 liters (one gallon) or less.

(d) No more than 208 liters (55 gallons) of combustible liquids may be stowed in any machinery space.

(e) An aggregate of more than 7.6 liters (two gallons) of flammable or combustible liquids stowed outside of an accommodation, control, or service, space (other than a paint locker) or outside of a machinery space must be stowed in a paint locker that is marked with a warning sign indicating flammable or combustible liquid storage.

(f) Flammable and combustible liquids used as fuel for portable auxiliary equipment must be stored in—

(1) Integral tanks that form part of the vessel's structure;

(2) An independent tank meeting the requirements of subpart 58.50 of Part 58 of this chapter;

(3) A container meeting the requirements of subpart D of 49 CFR 173.119 for the storage of flammable or combustible liquids;

(4) A protable outboard fuel tank meeting the specifications of ABYC H-25-81 or one identified by Underwriters Laboratories as meeting the specifications of UL 1185;

(5) A portable safety container identified by Underwriters Laboratories as meeting the specifications of UL 30 or UL 1313; or

(6) A portable safety container identified by Underwriters Laboratories as meeting the requirements of UL 1314.

(g) Each portable container of flammable or combustible liquid used for portable auxiliary equipment must be stowed in a paint locker or an open location designated by the master.

(h) Fuel tanks for portable auxiliary equipment using flammable or combustible liquids may only be refilled on a vessel—

(1) By using a container described in paragraph (f)(2), (f)(4), or (f)(5) of this section which has a capacity not exceeding 23 liters (6 gallons); or

(2) In the case of portable outboard fuel tanks described in paragraph (f)(3) of this section, in accordance with paragraph (i) of this section.

(i) Portable containers or portable outboard fuel tanks may be refilled from a larger container of flammable or combustible liquid on the weather deck of a vessel, other than a small passenger vessel subject to Subchapter T of this chapter, provided that—

(1) A drip pan of adequate size is used to collect any drippings; and

(2) At least one Coast Guard approved Type B, Size I, fire extinguisher is within three meters (9.75 feet) of the refilling location.

§ 147.50 Fuel for cooking, heating, and lighting.

(a) Flammable and combustible liquids and gases not listed in this section are prohibited for cooking, heating, or lighting on any vessel, with the exception of combustible liquids on cargo vessels.

(b) Fluid alcohol is prohibited for cooking, heating, or lighting on ferry vessels. Fluid alcohol burners, where wet primed, must have a catch pan not less than ¾ of an inch deep secured inside of the frame of the stove or have the metal protection under the stove flanged up ¾ of an inch to form a pan.

(c) Containers of solidified alcohol must be secured on a fixed base.

(d) Liquefied or non-liquefied gas is prohibited for cooking, heating, and lighting on ferry vessels, but may be used on other inspected vessels if the system in which it is used meets the applicable requirements of subpart 58.16 or subpart 184.05 of this chapter, as appropriate, or is approved by the Commandant (G-MTH).

(e) Kerosene and commercial standard fuel oil No. 1, No. 2, and No. 3 ar prohibited for cooking, heating, or lighting on ferry or passenger vessels unless the following conditions are met:

(1) Pressure or gravity feed must be used.

(2) Where wet priming is used in a cooking device, the device must have a catch pan not less than three fourths of an inch deep secured inside the frame of the device or a metal protector under the device with a least a three fourths inch flange to form a pan.

(3) Where wet priming is used, a non-flammable priming liquid must be used.

(4) Fuel tanks for fixed stoves must be separated from the stove and mounted in a location open to the atmosphere or mounted inside a compartment with an outside fill and vent.

(5) Fuel lines must have an easily accessible shut-off valve at the tank.

(6) If the fuel tank is outside of a stove compartment, a shut-off valve must be fitted at the stove.

[CGD 84-044, 53 FR 7749, Mar. 10, 1988, as amended by CGD 83-013, 54 FR 6402, Feb. 10, 1989; 55 FR 3959, Feb. 6, 1990]

§ 147.60 Compressed gases.

(a) *Cylinder requirements.* Cylinders used for containing hazardous ships' stores that are compressed gases must be—

(1) Authorized for the proper shipping name of the gas in accordance with 49 CFR 172.101 and 49 CFR part 173;

(2) Constructed in accordance with subpart C of 49 CFR part 178 or exempted under 49 CFR part 107;

(3) Filled, marked, and inspected in accordance with 49 CFR 173.301 through 173.308; and

(4) Except as provided in § 147.65, maintained and retested in accordance with 49 CFR 173.34

(b) *Stowage and care of cylinders.* (1) Cylinders must always be secured and, when not in use, they must be stowed in a rack in an upright position, with the valve protection cap in place.

(2) Lockers or housings must be vented to the open air near the top and bottom for positive circulation of vapors.

(3) Cylinders must be protected from all sources of heat which may cause the cylinders to be heated to a temperature higher than 130°F.

(c) *Pressure vessels other than cylinders.* Pressure vessels, other than cylinders subject to paragraph (a) of this section, used for containing ships' stores that are compressed gases must—

(1) Be constructed and inspected in acordance with part 54 of this chapter; and

(2) Carry only nitrogen or air, unless permission is granted by Commandant (G-MTH) to do otherwise.

§ 147.65 Carbon dioxide and halon fire extinguishing systems.

(a) Carbon dioxide or halon cylinders forming part of a fixed fire extinguishing system must be retested, at least, every 12 years. If a cylinder is discharged and more than five years have elapsed since the last test, it must be retested before recharging.

(b) Carbon dioxide or halon cylinders must be rejected for further service when they—

(1) Leak;

(2) Are dented, bulging, severely corroded, or otherwise in a weakened condition;

(3) Have lost more than five percent of their tare weight; or

(4) Have been involved in a fire.

(c) Cylinders which have contained carbon dioxide or halon and have not been tested within five years must not be used to contain another compressed gas on board a vessel, unless the cylinder is retested and re-marked in accordance with § 147.60 (a)(3) and (a)(4).

(d) Flexible connections between cylinders and distribution piping of semi-portable or fixed carbon dioxide fire extinguishing systems and discharge hoses in semi-portable carbon dioxide fire extinguishing systems must be renewed or tested at a pressure of 6.9 MPa (1000 psig). At test pressure, the pressure must not drop at a rate greater than 1.03 MPa (150 psi) per minute for a two minute period. The test must be performed when the cylinders are retested.

(e) Flexible connections between cylinders and distribution piping of fixed halon fire extinguishing systems must be tested at a pressure of one and one-half times the cylinder service pressure as marked on the cylinder. At test pressure, the pressure must not drop at a rate greater than 1.03 MPa (150 psi) per minute for a two minute period. The test must be performed when the cylinders are retested.

§ 147.70 Acetylene.

(a) Seventeen cubic meters (600 standard cubic feet) or less of acetylene may be stowed on or below decks on any vessel.

(b) More than 17 m^3 (600 standard cubic feet) of acetylene may be on board a vessel engaged in industrial operations, if it is stowed on deck.

§ 147.85 Oxygen.

(a) Eighty five cubic meters (3000 standard cubic feet) or less of oxygen may be on board any vessel.

(b) More than 85 m^3 (3000 standard cubic feet) of oxygen may be on board a vessel engaged in industrial operations, if it is stowed on deck or in a well ventilated space.

§ 147.90 Refrigerants.

(a) Only refrigerants listed in ANSI/ASHRAE 34-78 may be carried as ships' stores.

(b) Refrigerants contained in a vessel's operating system are not considered as being carried as ship's stores.

§ 147.95 Explosives.

(a) *Explosives—general.* Except as provided for elsewhere in this subchapter, explosives, as defined in 49 CFR 173.50, which are hazardous ships' stores must be stowed in a magazine which is constructed and located in accordance with 49 CFR 176.135 through 176.159.

(b) *Small arms ammunition.* (1) No person shall bring, have in their possession, or use on board a vessel any small arms ammunition, except by express permission of the matter of the vessel.

(2) All small arms ammunition must be stowed in a locked metal magazine or locker. The key to the locker must be kept in the possession of the master or a person designated by the master.

(c) *Ships' signals and emergency equipment.* (1) Explosive ships' signals and emergency equipment, including pyrotechnic distress signals and line throwing equipment, must be stowed in watertight containers or wood lined magazine chests.

(2) All pyrotechnic distress signals rockets, and line throwing guns must be stowed in accordance with the requirements of 49 CFR 176.83.

§ 147.100 Radioactive materials.

(a) Radioactive materials must not be brought on board, used in any manner, or stored on the vessel, unless the use of the materials is authorized by a current license issued by the Nuclear Regulatory Commission (NRC) under 10 CFR Parts 30 and 34.

(b) Stowage of radioactive materials must conform to the requirements of the NRC license.

§ 147.105 Anesthetics, drugs, and medicines.

Anesthetics, drugs, and medicines must be stowed and dispensed in accordance with the DHHS Publication No. (PHS) 84-2024.

PART 147A—INTERIM REGULATIONS FOR SHIPBOARD FUMIGATION

GENERAL

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147A.31 Removal of fumigation mate
and warning signs.

SPECIAL REQUIREMENTS FOR FLAMMABLE FUMIGANTS

147A.41 Person in charge of fumigation; flammable fumigants.
147A.43 Other sources of ignition; flammable fumigants.

AUTHORITY: 46 U.S.C. App. 1804; 49 CFR 1.46.

SOURCE: CGD 74-144, 39 FR 32998, Sept. 13, 1974, unless otherwise noted.

GENERAL

§ 147A.1 Purpose.

The purpose of this part is to prescribe the requirements for shipboard fumigation that are critical for the health and safety of the crew and any other person who is on board a vessel during fumigation. These are interim rules pending further study and promulgation of comprehensive regulations on shipboard fumigation.

§ 147A.3 Applicability.

This part prescribes the rules for shipboard fumigation on vessels to which 49 CFR Parts 171—179 apply under 49 CFR 176.5.

[CGD 86-033, 53 FR 36026, Sept. 16, 1988]

§ 147A.5 General requirement.

No person may cause or authorize shipboard fumigation contrary to the rules in this part.

§ 147A.6 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989]

§ 147A.7 Definitions.

As used in this part:

(a) *Qualified person* means a person who has experience with the particular fumigant or knowledge of its properties and is familiar with fumigant detection equipment and procedures, or an applicator who is certified by the Environmental Protection Agency if his certification covers the fumigant that is used.

(b) *Fumigant* means a substance or mixture of substances that is a gas or is rapidly or progressively transformed to the gaseous state though some nongaseous or particulate matter may remain in the space that is fumigated.

(c) *Fumigation* means the application of a fumigant on board a vessel to a specific treatment space.

§ 147A.9 Persons in charge of fumigation and the vessel; designation.

(a) The person, including any individual, firm, association, partnership, or corporation, that is conducting a fumigation operation shall designate a person in charge of fumigation for each operation.

(b) The operator of each vessel shall designate a person in charge of the vessel for each fumigation operation.

§ 147A.10 Notice to Captain of the Port.

Unless otherwise authorized by the Captain of the Port, at least 24 hours before fumigation the operator of the vessel shall notify the Coast Guard Captain of the Port, for the area where the vessel is to be fumigated, of the time and place of the fumigation, and the name of the vessel that is to be fumigated.

BEFORE FUMIGATION

§ 147A.11 Person in charge of fumigation; before fumigation.

(a) The person in charge of fumigation shall notify the person in charge of the vessel of:

(1) The space that is to be fumigated;

(2) The name, address, and emergency telephone number of the fumigation company;

(3) The dates and times of fumigation;

(4) The characteristics of the fumigant;

(5) The spaces that are determined to be safe for occupancy paragraph (b)(1)(i) of this section;

(6) The maximum allowable concentration of fumigant in spaces, if any, that are determined to be safe for occupancy under paragraph (b)(1)(i) of this section;

(7) The symptoms of exposure to the fumigant; and

(8) Emergency first aid treatment for exposure to the fumigant.

(b) The person in charge of fumigation shall ensure that:

(1) A marine chemist or other qualified person who has knowledge of and experience in shipboard fumigation evaluates the vessel's construction and configuration and determines:

(i) Which spaces, if any, are safe for occupancy during fumigation; and

(ii) The intervals that inspections must be made under § 147A.21(a)(1);

(2) No persons or domestic animals are in the space that is to be fumigated or the spaces that are designated as unsafe for occupancy under paragraph (b)(1)(i) of this section;

(3) There is proper and secure sealing to confine the fumigant to the space that is to be fumigated, including blanking off and sealing any ventilation ducts and smoke detectors;

(4) The personal protection and fumigation detection equipment for the fumigant that is to be used is on board the vessel;

(5) Warning signs are:

(i) Posted upon all gangplanks, ladders, and other points of access to the vessel;

(ii) Posted on all entrances to the spaces that are designated as unsafe for occupancy under paragraph (b)(1)(i) of this section; and

(iii) In accordance with section 432 of the Standard for Fumigation (NFPA No. 57-1973) of the National Fire Protection Association (copies may be obtained by requesting NFPA No. 57-1973 from the National Fire Protection Association, International, 470 Atlantic Avenue, Boston, Massachusetts 02210); and

(6) Watchmen are stationed at all entrances to:

(i) Spaces that are not determined to be safe for occupancy under paragraph (b)(1)(i) of this section; or

(ii) The vessel, if no spaces are determined to be safe for occupancy under paragraph (b)(1)(i) of this section.

[CGD 74-144, 39 FR 32998, Sept. 13, 1974; 39 FR 37771, Oct. 24, 1974]

§ 147A.13 Person in charge of the vessel; before fumigation.

(a) After notice under § 147A.11 (a)(5), the person in charge of the vessel shall notify the crew and all other persons on board the vessel who are not participating in the fumigation of the spaces that are determined to be safe for occupancy under § 147A.11(b)(1)(i).

(b) If no spaces are determined to be safe for occupancy under § 147A.11 (b)(1)(i), the person in charge of the vessel shall ensure that the crew and all persons who are not participating in the fumigation leave the vessel and remain away during fumigation.

DURING FUMIGATION

§ 147A.21 Person in charge of fumigation during fumigation.

(a) Until ventilation begins, or until the vessel leaves port, the person in charge of fumigation shall ensure that a qualified person inspects the vessel as follows:

(1) He must use detection equipment for the fumigant that is used to ensure that the fumigant is confined to:

(i) The space that is fumigated, if partial occupancy is allowed under § 147A.11(b)(1)(i); or

(ii) The vessel, if no space is determined to be safe for occupancy under § 147A.11(b)(1)(i).

(2) He must make inspections at the intervals that are determined to be necessary by the marine chemist or qualified person under § 147A.11 (b)(1)(ii).

(b) If leakage occurs, the person in charge of fumigation shall:

(1) Notify the person in charge of the vessel that there is leakage;

(2) Ensure that all necessary measures are taken for the health and safety of any person; and

(3) Notify the person in charge of the vessel when there is no danger to the health and safety of any person.

(c) After the exposure period, if the vessel is in port, the person in charge of fumigation shall ensure that fumigators or other qualified persons ventilate the space that is fumigated as follows:

(1) Hatch covers and vent seals must be removed, other routes of access to the atmosphere must be opened, and if necessary, mechanical ventilation must be used.

(2) Personal protection equipment that is appropriate for the fumigant that is used must be worn.

(d) If ventilation is completed before the vessel leaves port, the person in charge of fumigation shall:

(1) Ensure that a qualified person, who is wearing the personal protection equipment for the fumigant that is used if remote detection equipment is not used, tests the space that is fumigated and determines if there is any danger to the health and safety of any person, including a danger from fumigant that may be retained in bagged, baled, or other absorbent cargo;

(2) Notify the person in charge of the vessel of this determination; and

(3) If it is determined that there is a danger:

(i) Ensure that all measures are taken that are necessary for the health and safety of all persons; and

(ii) Notify the person in charge of the vessel when there is no danger to the health and safety of any person.

§ 147A.23 Person in charge of vessel; during fumigation.

(a) The person in charge of the vessel shall ensure that the crew and all other persons on board the vessel who are not participating in the fumigation restrict their movement during fumigation to the spaces that are determined to be safe for occupancy under § 147A.11(b)(1)(i).

(b) The person in charge of the vessel shall ensure that the crew and all other persons who are not participating in the fumigation follow any instructions of the person in charge of fumigation that are issued under § 147A.21(b)(2) or (d)(3)(i) and that the vessel does not leave port if he is notified under:

(1) Section 147A.21(b)(1) that there is leakage, unless the person in charge of fumigation notifies him under § 147A.21(b)(3) of this subpart that there is no danger; or

(2) Section 147A.21(d)(2) that there is a danger after ventilation, unless the person in charge of the fumigation notifies him under § 147A.21(d)(3)(ii) that there is no danger.

(c) If fumigation is not completed before the vessel leaves port, the person in charge of the vessel shall ensure that personal protection and fumigant detection equipment for the fumigant that is used is on board the vessel.

(d) If the vessel leaves port before fumigation is completed, the person in charge of the vessel shall ensure that a qualified person makes periodic inspections until ventilation is completed and this person shall use detection equipment for the fumigant that is used to determine if:

(1) There is leakage of fumigant; or

(2) There is a concentration of fumigant that is a danger to the health and safety of any person.

(e) If the qualified person determines under paragraph (d) of this section that there is leakage or a concentration of fumigant that is a danger to the health and safety of any person, the person in charge of the vessel shall take all measures that are, in his discretion, necessary to ensure health and safety of all persons who are on board the vessel. If the danger is due to leakage, he shall also ensure that qualified persons immediately ventilate in accordance with paragraphs (c)(1) and (2) of § 147A.21.

(f) If the vessel leaves port during the exposure period, the person in charge of the vessel shall ensure that the space that is fumigated is ventilated by qualified persons after the exposure period in accordance with paragraphs (c) (1) and (2) of § 147A.21.

(g) If ventilation is completed after the vessel leaves port, the person in charge of the vessel shall ensure that a qualified person, who is wearing the personal protection equipment for the fumigant that is used if remote detection equipment is not used, tests the space that is fumigated to determine if there is a danger to the health and safety of any person, including a danger from fumigant that may be retained in bagged, baled, or other absorbent cargo. If the qualified person determines that there is a danger, the person in charge of the vessel shall take all measures that are, in his discretion, necessary to ensure the health and safety of all persons who are on board the vessel.

§ 147A.25 Entry.

(a) No person may enter the spaces that immediately adjoin the space that is fumigated during fumigation unless entry is for emergency purposes or the space is tested and declared safe for human occupancy by a marine chemist or other qualified person and is inspected under § 147A.21(a)(2) or § 147A.23(d).

(b) If entry is made for emergency purposes:

(1) No person may enter the space that is fumigated or any adjoining spaces during fumigation unless he wears the personal protection equipment for the fumigant that is in use;

(2) No person may enter the space that is fumigated unless the entry is made by a two person team; and

(3) No person may enter the space that is fumigated unless he wears a lifeline and safety harness and each life-line is tended by a person who is outside the space and who is wearing the personal protection equipment for the fumigant that is in use.

AFTER VENTILATION

§ 147A.31 Removal of fumigation material and warning signs.

After ventilation is completed and a marine chemist or other qualified person determines that there is no danger to the health and safety of any person under § 147A.21(d) or § 147A.23(g), the person in charge of fumigation, or, if the vessel has left port, the person in charge of the vessel, shall ensure that all warning signs are removed and fumigation containers and materials are removed and disposed of in accordance with the manufacturer's recommendations.

SPECIAL REQUIREMENTS FOR FLAMMABLE FUMIGANTS

§ 147A.41 Person in charge of fumigation; flammable fumigants.

(a) The person in charge of fumigation shall ensure that:

(1) Before the space that is to be fumigated is sealed, it is thoroughly cleaned, and all refuse, oily waste, and other combustible material is removed;

(2) Before fumigation, all fire fighting equipment, including sprinklers and fire pumps, is in operating condition; and

(3) Before and during fumigation, electrical circuits that are in the space that is fumigated are de-energized.

§ 147A.43 Other sources of ignition; flammable fumigants.

While the space that is fumigated is being sealed or during fumigation, no person may use matches, smoking materials, fires, open flames, or any other source of ignition in any spaces that are not determined to be safe for occupancy under § 147A.11(b)(1)(i).

PART 148—CARRIAGE OF SOLID HAZARDOUS MATERIALS IN BULK

Subpart 148.01—General

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148.04-15 Petroleum coke, uncalcined; p troleum coke, uncalcined and calci (mixture).
148.04-17 Petroleum coke, calcined, at 1 F or above.

Sec.
148.04-19 Tankage, garbage or rough ammoniate, solid.
148.04-20 Sulfur.
148.04-21 Coconut meal pellets (also known as copra pellets).
148.04-23 Unslaked lime in bulk.

AUTHORITY: 49 U.S.C. App. 1804; 49 CFR 1.46.

SOURCE: CGD 83-067a, 49 FR 16794, Apr. 20, 1984, unless otherwise noted.

Subpart 148.01—General

§ 148.01-1 Purpose and applicability.

(a) This part prescribes regulations under which bulk solid hazardous materials may be transported. Each master, person in charge of the vessel, owner, charterer and agent shall ensure compliance with this part and communicate the requirements of this part to every person performing any function covered by this part. Each person involved in the transportation of bulk solid hazardous materials shall comply with the requirements of this part within the scope of his job responsibilities.

(b) For the purposes of this part, the term "bulk" applies only to cargoes transported on board cargo vessels or barges without mark or count and which are to be directly loaded into the holds of such vessels or barges without containers or wrappers.

(c) For the purposes of this part, the term "vessel" means a "cargo vessel or barge" which is not exempted under 49 U.S.C. 1806(b).

(d) For the purposes of this part, the term "transported" includes the various operations associated with the cargo transportation such as, loading, off-loading, handling, storing, stowing, carrying, conveying, using, etc.

(e) The term "hazardous materials" includes a number of specific classes, the definitions of which are contained in 49 CFR parts 170-189.

§ 148.01-7 Permitted cargoes.

(a) The solid hazardous materials cargoes listed here may be transported in bulk on board vessels if they comply with the regulations in this part. Unlisted cargoes may be transported only if express authority is given by the Commandant in accordance with § 148.01-9 of this subpart.

Shipping name of the hazardous material	Hazard class of the hazardous materials	Characteristic properties of the material
Aluminum dross	Flammable solid	Contact with water may cause self heating and the evolution of flammable gas.
Aluminum nitrate	Oxidizing materials	If involved in a fire will greatly intensify the burning of combustible materials.
Ammonium nitrate containing not more than 80 pct ammonium nitrate and not less than 20 pct calcium carbonate with no more than 2 pct inorganic coating, in the form of uniform and nonsegregatable granular particles.	Oxidizing material	Do.
Ammonium nitrate fertilizer, formulation or mixture containing less than 60 pct ammonium with no organic filler.	do	Do.
Ammonium sulfate nitrate	ORM-C	If involved in a fire will intensify the burning of combustible materials.
Barium nitrate	Oxidizing material	If involved in a fire will greatly intensify the burning of combustible materials.
Calcium nitrate	do	Do.
Charcoal briquets	Flammable solid	Contact with water may cause self heating.
Coconut meal pellets (or copra pellets) containing at least 6 pct and not more than 13 pct moisture and not more than 10 pct residual fat content.	ORM-C	Subject to spontaneous heating by biological decay or by oxidation.
Copra, dry	do	Susceptible to spontaneous heating or fire from spark or open flame.
Ferrophosphorus	ORM-A	May evolve poisonous gas (phosphine) in contact with moisture.
Ferrosilicon, containing less than 45 pct or more than 70 pct silicon.	do	May evolve poisonous and flammable gases (arsine/phosphine) in contact with water, acids or alkalines.
Ferrous metal borings, shavings, turnings, or cuttings (excluding stainless steel).	ORM-C	Susceptible to spontaneous heating and ignition.

Shipping name of the hazardous material	Hazard class of the hazardous materials	Characteristic properties of the material
Fishmeal or scrap, ground and pelletized (mixture), containing 6 to 12 pct moisture and no more than 18 pct fat by weight.	......do	Do.
Lead nitrate	Oxidizing material	If involved in a fire will greatly intensify the burning of combustible materials.
Lime, unslaked	ORM-B	Evolves heat on contact with water.
Magnesium nitrate	Oxidizing material	If involved in fire will greatly intensify the burning of combustible materials.
Petroleum coke, calcined, at 130° F or above	ORM-C	Susceptible to spontaneous heating and ignition.
Petroleum coke, uncalcined	......do	Do.
Postassium nitrate	Oxidizing material	If involved in a fire will greatly intensify the burning of combustible materials.
Radioactive material, low specific activity (LSA)	Radioactive material	Radiation hazard from ingestion, inhalation and contact with mucous membranes.
Sawdust	ORM-C	Susceptible to fire from sparks or open flames.
Sodium nitrate	Oxidizing material	If involved in a fire will greatly intensify the burning of combustible materials.
Sodium nitrate, potassium nitrate mixture; 67 pct Sodium nitrate, 30 pct Postassium nitrate and not more than 3 percent miscellaneous inorganic compounds.	......do	Do.
Strontium nitrate (not radioactive)	......do	Do.
Sulfur	ORM-C	Dust forms explosive mixtures with air.
Tankage, garbage or rough ammoniate solid, containing 7 pct or more moisture.	......do	Susceptible to spontaneous heating and ignition.

NOTE: Definitions of hazard classes of hazardous materials are found in 49 CFR 171.8 and 49 CFR 173.500.

(b) A mixture or blend of two or more cargoes, one or more of which is listed in paragraph (a) of this section, will be treated as an unlisted cargo and specific authorization by the Commandant, in accordance with § 148.01-9, for shipment in bulk is required.

§ 148.01-9 Filing of special petition for special permit.

(a) A petition for authorization to transport an unlisted cargo or to use alternative procedures must be submitted to the U.S. Coast Guard (G-MTH), Washington, DC 20593, and must contain the following minimum information:

(1) The regulatory provisions involved.

(2) The justification for the proposed shipments or alternative procedure, including any reasons why the current regulations are not appropriate, why the public interest would be served by the proposal, and the basis upon which the proposal would provide an equivalent degree of safety to those shipments conducted in accordance with the current regulations.

(3) A detailed description of the proposal, including when appropriate, drawings, plans, calculations, procedures, test results, previous approvals or permits, and any other supporting information.

(4) The chemical name, common name, hazard classification for properties (chemical and physical), and characteristics of the materials covered by the proposal, including composition and ingredient percentages (specified by weight) if a mixture.

(5) Any relevant shipping or accident experience.

(6) A description of the vessel or vessels to be employed for the shipments and the U.S. ports to be involved.

(7) A statement or recommendation regarding any changes to the regulations which would be desirable to obviate the need for similar permission from the Commandant.

(b) Unless there is a good reason for priority treatment, each proposal is considered in the order in which it is received. To permit timely consideration, proposals should be submitted at least 45 days before the requested effective date.

§ 148.01-11 Special permits; standard conditions.

(a) Each person to whom a special permit is issued under the terms of § 148.01-9 shall comply with all requirements of this part except as specifically provided by the terms of the special permit.

(b) Unless otherwise specified in the special permit, each shipment made under special permit must comply with the following:

(1) Each shipping paper issued and the dangerous cargo manifest prepared in connection with such shipment must bear the notation "CG Special Permit No. *" with the * to be filled in with the assigned special permit number.

(2) Each person to whom a special permit is issued shall furnish a summary of experience to the U.S. Coast Guard (G-MTH), Washington, DC 20593, before the date of expiration of the permit and when any amendment to the special permit is requested. The information must include the number of shipments made, tonnage of each shipment, and what vessel's and U.S. Ports were involved. In addition, an immediate report must be submitted the U.S. Coast Guard (G-MTH) in the event of any casualty, accident, or damaging incident which occurs when transporting solid hazardous materials in bulk under the terms of a special permit.

(3) A copy of the special permit, kept current, and any amendments thereto, must be on board each vessel while transporting solid hazardous materials in bulk under the terms of a special permit. The special permit must be kept with the dangerous cargo manifest (§ 148.02-3).

(c) Each permit is subject to suspension or revocation for cause by the U.S. Coast Guard before its expiration date.

§ 148.01-13 Assignment and certification.

(a) The National Cargo Bureau, Inc., is authorized to assist the U.S. Coast Guard in administering the provisions contained in this part that are applicable to the transportation of solid hazardous materials in bulk on vessels with respect to:

(1) Inspection of vessels for suitability for loading such materials in bulk;

(2) Examination of stowage of such materials loaded in bulk on board vessels;

(3) Making recommendations as to stowage requirements applicable to the transportation of such materials in bulk; and

(4) Issuing of certificates of loading, setting forth that the stowage of such materials in bulk is in accordance with applicable regulations contained in this part.

(b) Certificates of loading from the National Cargo Bureau, Inc., are accepted as evidence of compliance with the applicable provisions of this part with respect to the transportation of solid hazardous materials in bulk on board vessels.

§ 148.01-15 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989]

Subpart 148.02—Vessel Requirements

§ 148.02-1 Shipping papers.

(a) Carriers may not accept for transportation nor transport by vessel in bulk any solid hazardous materials listed in § 148.01-7(a) of this part, unless the hazardous materials offered for such shipment is accompanied by a shipping paper on which the following information is shown:

(1) The shipping name and hazard class of the hazardous material as listed in § 148.01-7(a) of this part.

(2) The quantity of the hazardous material to be transported.

(3) The name and address of the U.S. shipper or his authorized representative.

(4) A certification which bears the following statement, signed by the shipper or his authorized representative: "This is to certify that the above-named hazardous material is properly named, prepared, and otherwise in proper condition for bulk shipment by vessel in accordance with the applica-

ble regulations of the U.S. Coast Guard".

(b) For import shipments, the consignee shall advise the carrier or foreign shipper (consignor) of the applicable U.S. Coast Guard regulations. The carrier or foreign shipper (consignor) shall then furnish the information required in paragraph (a) of this section, as advised by the consignee, either on the shipping papers or dangerous cargo manifest.

(c) The shipping paper required in paragraph (a) of this section must be kept on board the towing vessel along with the dangerous cargo manifest (§ 148.02-3 of this subpart) except when the shipment is by an unmanned barge in which case it may be kept on board the towing vessel. When an unmanned barge is moored, the shipping paper must remain on board the barge, in a readily retrievable location, such as a metal tube attached to the barge.

§ 148.02-3 Dangerous cargo manifest.

(a) Each vessel, except for unmanned barges, transporting solid hazardous materials in bulk under the terms of this part must have on board a dangerous cargo manifest, kept in a conspicuous place on or near the bridge house, on which the following information is entered:

(1) Name of vessel and official number. (If the vessel has no official number, the international radio call sign must be substituted.)

(2) Nationality of vessel.

(3) The name of the hazardous material as listed in § 148.01-7(a) of this part.

(4) The hold(s) in which the material is being transported.

(5) The quantity of the material loaded in each hold.

(6) Date and signature of Master of the vessel's owner or his authorized representative to acknowledge correctness of the dangerous cargo manifest.

§ 148.02-5 Report of hazardous materials incidents.

In the event of an incident involving hazardous materials, an immediate report must be sent in accordance with 49 CFR 171.15.

Subpart 148.03—Minimum Transportation Requirements

§ 148.03-1 General.

The regulations in this subpar apply to each bulk shipment of a soli hazardous material listed in § 148.01- of this part.

§ 148.03-3 Direction and observation.

Loading or off-loading of a solid ha ardous material in bulk within th navigable waters of the U.S. must b conducted only under the directio and observation of a person assigne or employed for such duty by the ve sel's master or owner or authori representative.

§ 148.03-5 Prior to loading.

Prior to loading any solid hazardo material in bulk on board a vessel:

(a) Each hold must be thoroug cleaned of all loose debris and du nage; but permanent wooden batte or sheathing may remain in the ho and

(b) Each hold and each bilge of th hold must be dry.

§ 148.03-7 During transport.

During the transport of a solid ha ardous material in bulk, except for u manned vessels, cargo shall be perio cally inspected to ensure that the are no undetected increases in temp ature in that cargo and that no oth changes in the cargo are occurri that might affect the safety of t vessel and the results of these insp tions shall be recorded in a log.

§ 148.03-11 Stowage conditions.

(a) Other hazardous materials ca must not be stowed in the same h or on deck above a hold in which solid hazardous material in bulk loaded.

(b) No explosive Class C, flamm liquid, flammable solid, flammable nonflammable compressed gas, org peroxide, or extremely danger poison may be stowed in any hold a jacent to a hold in which a solid h ardous material in bulk is loaded.

(c) All explosive Class A and B m rials must be stowed longitudinally least one hold (or an equivalent l udinal distance if on deck) from any old in which hazardous material in ulk is loaded.

(d) Combustible cargo must not be towed in a hold in which a solid hazrdous material in bulk is loaded.

148.03-13 Completion of off-loading.

Upon the completion of off-loading f a solid hazardous material in bulk, ach hold must be thoroughly cleaned f all residue of such material.

Subpart 148.04—Special Additional Requirements for Certain Material

148.04-1 Radioactive material, Low Specific Activity (LSA).

(a) Authorized materials are limited o:

(1) Uranium or thorium ores and hysical or chemical concentrates of uch ores;

(2) Uranium metal, natural thorium netal and alloys of these metals; and

(3) Material of low radioactive conentration, if the estimated radioactivty concentration dose not exceed .001 millicurie per gram and the conribution from Group I material (See itle 49 CFR parts 170 to 189, incluive) does not exceed 1 percent of the otal radioactivity.

(b) Each hold used for the transporation of any of these materials must e surveyed with appropriate radiation-detection instruments after the ompletion of off-loading. Such holds must not again be used for the transportation of any cargo until the radiation dose rate at any accessible surface is less than 0.5 millirem per hour and until there is no significant removable radioactive surface contamination according to 49 CFR 173.443.

(c) Each hold or barge used for ransportation of any of these materials must be effectively closed or covered to prevent dispersal of the material during transportation.

148.04-9 Fishmeal or scrap, ground or pelletized; fishmeal or scrap, ground and pelletized (mixture).

(a) The fishmeal or scrap, ground or elletized and fishmeal or scrap, round and pelletized mixture must ontain at least 6 percent moisture by weight but not more than 12 percent moisture by weight.

(b) The material must not contain more than 18 percent fat by weight.

(c) At the time of production of the material, it must be treated with at least 400 ppm antioxidant (ethoxyquin); in the case where the material contains more than 12 percent fat by weight, it must be treated with at least 1000 ppm antioxidant (ethoxyquin) at the time of production.

(d) Shipment of the material in bulk must take place within twelve months of the date of production.

(e) The temperature of the material to be loaded must not, at the time of loading exceed 35° C (95° F), or 5° F above ambient temperature, whichever is greater.

(f) The material must contain at least 100 ppm antioxidant (ethoxyquin) at the time of shipment.

(g) Each shipment of the material in bulk must be accompanied by a statement in which the shipper certifies:

(1) The moisture content of the material;

(2) The fat content of the material;

(3) The concentration of antioxidant (ethoxyquin) in the material in ppm at the time the material is loaded on a vessel in bulk;

(4) Date and place of production of the material; and

(5) The physical state of the material (ground, pelletized, or mixture).

(h) Temperature readings must be taken three times a day and recorded. If the temperature of the cargo exceeds 130° F and continues to increase, ventilation to the hold must be restricted.

§ 148.04-13 Ferrous metal borings, shavings, turnings, or cuttings (excluding stainless steel).

(a) This section applies to the stowage and transportation in bulk of hazardous materials described as ferrous metal borings, shavings, turnings, or cuttings on board vessels (excluding stainless steel). However, unmanned barges on which the article is stowed for or transported on a voyage entirely on the navigable waters of the United States are exempt from the requirements of this section. Ferrous metal borings, shavings, turnings, or cuttings (excluding stainless steel) must not be stowed and transported in bulk unless the following conditions are met:

(1) [Reserved]

(2) All wooden sweat battens, dunnage and debris must be removed from the hold before the article is loaded.

(3) During loading and transporting, the bilge of each hold in which the article is stowed or is to be stowed must be as dry as practicable.

(4) During loading, the article must be compacted in the hold as frequently as practicable with a bulldozer or means that provide equivalent surface compaction. Upon completion of loading, the article must be trimmed to eliminate peaks or mounds and compacted.

(5) Other cargo must not be loaded in a hold containing the article if:

(i) The cargo to be loaded in the same hold with the article is another hazardous material as defined in this part or a combustible material;

(ii) The loading of the article is not completed first; and

(iii) The temperature of the article in the hold is above 130° F or has increased within eight hours before loading of the other cargo.

(6) During loading, the temperature of the article in the pile being loaded must be less than 130° F.

(7) Upon completion of loading, the vessel may not leave the port unless:

(i) The temperature of each article in each hold is less than 150° F and, if the temperature of the article in a hold has been more than 150° F during loading, the temperature of each article has shown a downward trend below 150° F for at least eight hours after completion of loading of the hold; or

(ii) The vessel intends to sail directly to another port that is no further than twelve hours sailing time for the vessel concerned, for the purpose of loading more of the article in bulk or to completely off-load the article, and the temperature of the article is less than 190° F and has shown a downward trend for a least eight hours after completion of loading.

(b) For the purposes of each temperature requirement of this section, the temperature of the article is the highest temperature taken between eight and fourteen inches below the surf at ten-foot intervals over its len and width.

(c) The master or person in cha of a vessel that is loading or transpo ing the article must ensure that temperature of the article is taken:

(1) Before loading;

(2) During loading, in each hold in the pile being loaded at least eve twenty-four hours and, if the tempe ture is rising, as often as necessary ensure the conditions in this secti are met; and

(3) After loading, in each hold least every twenty-four hours.

(d) During loading, if the tempe ture of the article in a hold is 200° F higher, the master or person in cha of the vessel must notify the Co Guard Captain of the Port and s pend loading until the temperature the article is less than 190° F.

(e) After loading:

(1) If the temperature of the arti is 150° F or above, the master person in charge must notify the Ca tain of the Port and ensure that vessel remains in the port area un the conditions of paragraph (a)(7) of this section are met; or

(2) In the case of a short-durati voyage to which paragraph (a)(7)(ii) this section applies, if the tempera of the article in a hold is 190° F above, the master or person in cha must notify the Captain of the P and ensure that the vessel remains the port area until the conditions paragraph (a)(7)(ii) of this section met.

(f) Except for shipments of the ar cle in bulk which leave the port loading under the conditions speci in paragraphs (a)(7)(ii) of this secti after the vessel leaves the port, if temperature of the article in the h rises above 149° F, the master m notify the nearest Coast Guard C tain of the Port as soon as possible

(1) The name, nationality, and p tion of the vessel;

(2) The most recent tempera taken;

(3) The length of time that the te perature has been above 149° F the rate of rise, if any;

(4) The port where the article was loaded and the destination of the article;

(5) The last port of call of the vessel and its next port of call;

(6) What action has been taken; and

(7) Whether any other cargo is endangered.

(g) To meet the conditions of this section, the master of a vessel that is transporting the article must ensure that each temperature taken is recorded.

§ 148.04-15 Petroleum coke, uncalcined; petroleum coke, uncalcined and calcined (mixture).

The material at 130° F or above must not be loaded in bulk on any vessel.

§ 148.04-17 Petroleum coke, calcined, at 130° F or above.

(a) The requirements of this part do not apply to bulk shipments of petroleum coke, calcined, on any vessel when the material is less than 130° F.

(b) The material must not be loaded in cargo vessels when temperatures exceed 225° F.

(c) Other hazardous materials must not be stowed in any hold adjacent to any other containing this material except as provided in paragraph (d) of this section.

(d) In holds over tanks containing fuel or material having a flashpoint under 200° F, a two-to-three foot layer of the material at a temperature not greater than 110° F must be first loaded into that hold. Only then may the material at 130° F or above be loaded into that hold.

(e) The loading of the material must be as follows:

(1) For shipments in holds over fuel tanks, the loading of the two-to-three foot layer of the material at a temperature not greater than 110° F (as required by paragraph (d) of this section) in these holds must be completed prior to the loading of the material at 130° F or above in any hold of the vessel.

(2) Upon completion of the loading described in paragraph (e)(1) of this section, a two-to-three foot layer of the material at 130° F or above must first be loaded in each hold (including those holds, if any, already containing a layer of the material at a temperature not greater than 110° F) in which the material is to be loaded in accordance with this section.

(3) Upon the completion of the loading of the two-to-three-foot layer of the material at 130° F or above in each hold, as required in paragraph (e)(2) of this section, the normal loading of the material at 130° F or above may proceed to completion.

(f) Personnel must be warned by the Master of the vessel or his authorized representative that calcined petroleum coke loaded and transported under the terms of this section is hot and that injury due to burns is possible.

§ 148.04-19 Tankage, garbage or rough ammoniate, solid.

(a) The material must contain at least 7 percent moisture by weight.

(b) The material must not be loaded if the temperature in the material, before loading, exceeds 100° F.

§ 148.04-20 Sulfur.

(a) When sulfur is loaded in a deep hold with general cargo in the 'tween deck hold above the sulfur, a dust proof wooden bulkhead enclosure must be built in the hatchways from the over deck of the lower hold to the weather deck forming a tight enclosure capable of preventing sulfur dust from entering the 'tween decks during loading.

(b) Ceiling must be made tight to prevent sulfur dust from entering the bilges; any chinking necessary in the way of tank tops or bilges must be made of noncombustible material.

(c) Cowl ventilators serving the hold into which sulfur is being loaded or discharged must be opened to provide circulation of air.

(d) No smoking is permitted on board the vessel and "No Smoking" signs must be conspicuously posted.

(e) If a metal chute is used it must be grounded using a flexible cable.

(f) Upon completion of loading, the sulfur must be leveled off. Any decks, bulkheads, or overheads containing sulfur dust must be swept clean or washed down.

(g) Other cargo, which is oxygen bearing, must not be stowed in the same hold with sulfur.

(h) An oxygen breathing apparatus, or proper gas mask, must be made available.

(i) A fire hose, preferably supplied with fresh water from a shore supply source, must be available at each hatch through which sulfur is being loaded.

§ 148.04-21 Coconut meal pellets (also known as copra pellets).

(a) Coconut meal pellets;

(1) Must contain at least 6 percent and not more than 13 percent moisture and not more than 10 percent residual fat contents;

(2) Must not be loaded if the temperature exceeds 120° F;

(3) Must not be stowed within 4 feet of any bulkheads subject to artificial heat; and

(4) Must not be overstowed with a other cargo.

(b) A clear space of at least 1 fo must be provided between the top the cargo and underside of de beams.

§ 148.04-23 Unslaked lime in bulk.

(a) Unslaked lime in bulk must transported in unmanned, all ste double-hulled barges equipped wi weathertight hatches or covers. T barge must not carry any other car while unslaked lime is on board.

(b) The originating shipping or and transfer shipping paper requi ment in § 148.02-1 and the danger cargo manifest requirements § 148.02-3 do not apply to the tra portation of unslaked lime under pa graph (a) of this section.

PART 149—[RESERVED]

SUBCHAPTER O—CERTAIN BULK DANGEROUS CARGOES

NOTE: 33 CFR part 157 contains additional design, equipment, and operation requirements for certain seagoing tankships and barges that carry oil in bulk.

(R.S. 4405, as amended (46 U.S.C. 375), R.S. 4462, as amended (46 U.S.C. 416), Sec. 6(b)(1), 80 Stat. 937 (49 U.S.C. 1655(b)(1); 49 CFR 1.46(b)))

[CGD 77-058a, 42 FR 32539, June 27, 1977]

PART 150—COMPATIBILITY OF CARGOES

Subpart A—Compatibility of Cargoes

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APPENDIX IV TO PART 150—DATA SHEET

AUTHORITY: 46 U.S.C. 3306, 3703; 49 CFR 1.45, 1.46. Section 150.105 issued under 44 U.S.C. 3507; 49 CFR 1.45.

SOURCE: CGD 75-59, 45 FR 70263, Oct. 23, 1980, unless otherwise noted.

Subpart A—Compatibility of Cargoes

§ 150.105 OMB control numbers assigned pursuant to the Paperwork Reduction Act.

(a) *Purpose.* This section collects and displays the control numbers assigned to information collection and recordkeeping requirements in this subchapter by the Office of Management and Budget (OMB) pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). The Coast Guard intends that this section comply with the requirements of 44 U.S.C. 3507(f) which requires that agencies display a current control number assigned by the Director of the OMB for each approved agency information collection requirement.

(b) *Display.*

46 CFR part or section where identified or described	Current OMB control N
§ 150.01-15	2115-001
§ 153.5	2115-001
§ 153.905	2115-008
§ 153.910	2115-008
§ 153.968	2115-008
Part 154	2115-011
§ 154.12	2115-001

[49 FR 38121, Sept. 27, 1984, as amended by CGD 77-069, 52 FR 31626, Aug. 21, 1987]

§ 150.110 Applicability.

This subpart prescribes rules fo identifying incompatible hazardou materials and rules for carrying thes materials in bulk as cargo in perma nently attached tanks or in tanks tha are loaded or discharged while aboar the vessel. The rules apply to all ves sels subject to 46 U.S.C. 391a.

§ 150.115 Definitions.

As used in this subpart: *Hazardou material* means:

(a) A flammable liquid as defined § 30.10-22 or a combustible liquid defined in § 30.10-15 of this chapter.

(b) A material listed in Table 151. Table 1 of Part 153, or Table 4 of Pa 154 of this chapter; or

(c) A liquid, liquefied gas, or co pressed gas listed in 49 CFR 172.101.

Person in charge means the mast of a self-propelled vessel, or the pers in charge of a barge.

§ 150.120 Definition of incompatible ca goes.

Except as described in § 150.150, cargo of hazardous material is inco patible with another cargo listed Table I if the chemical groups of th two cargoes have an "X" where th columns intersect in Figure 1 and a not shown as exceptions in Appendi I. (See also § 150.140.)

[CGD 83-047, 50 FR 33038, Aug. 16, 1985]

§ 150.130 Loading a cargo on vessels ca rying cargoes with which it is inco patible.

Except as described in § 150.160, th person in charge of a vessel sh ensure that the containment syst for a cargo that is a hazardous material meets the following requirements:

(a) The containment system must separate the hazardous material or its residue from any cargo in table I with which it is incompatible by two barriers such as formed by a:

(1) Cofferdam;

(2) Empty tank;

(3) Void space;

(4) Cargo handling space;

(5) Tank containing a compatible cargo; or

(6) Piping tunnel.

(b) In this subpart, isolation across a cruciform joint is equivalent to isolation by two barriers.

(c) The containment system for the hazardous material must not have a piping or venting system that connects to a containment system carrying a cargo with which the hazardous material is incompatible. Any such piping or venting system must have been separated from the containment system carrying the incompatible cargo by:

(1) Removing a valve or spool piece and blanking off the exposed pipe ends, or

(2) Installing two spectacle flanges in series with a means of detecting leakage into the pipe between the spectacle flanges.

§ 150.140 Cargoes not listed in Table I or II.

A cargo of hazardous material not listed in Table I or II must be handled as if incompatible with all other cargoes until the Commandant (G-MTH) (tel. no. (202) 267-1577) assigns the hazardous material to a compatibility group. (Table I lists cargoes alphabetically while Table II lists cargoes by compatibility group).

[CGD 83-047, 50 FR 33038, Aug. 16, 1985, CGD 86-100, 52 FR 21037, June 4, 1987]

§ 150.150 Exceptions to the compatibility chart.

The Commandant (G-MTH) authorizes, on a case by case basis, exceptions to the rules in this subpart under the following conditions:

(a) When two cargoes shown to be incompatible in Figure 1 meet the standards for a compatible pair in Appendix III, or

(b) When two cargoes shown to be compatible in Figure 1 meet the standards for an incompatible pair in Appendix III.

Appendix I contains cargoes which have been found to be exceptions to Figure 1, the Compatibility Chart.

[CGD 83-047, 50 FR 33038, Aug. 16, 1985]

§ 150.160 Carrying a cargo as an exception to the compatibility chart.

The Operator of a vessel having on board a cargo carried as an exception under § 150.150 but not listed in Appendix I, Exceptions to the Chart, shall make sure that:

(a) The Commandant (G-MTH) has authorized by letter or message the cargo pair as an exception to the compatibility chart; and

(b) A copy of the letter or message is on the vessel.

[CGD 75-59, 45 FR 70263, Oct. 23, 1980, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 83-047, 50 FR 33038, Aug. 16, 1985]

§ 150.170 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989]

Subpart B—Requirements for Vessels Engaged in Bulk Hazardous Waste Incineration at Sea

Source: CGD 84-025, 53 FR 15834, May 4, 1988, unless otherwise noted.

General

§ 150.200 Applicability.

This subpart prescribes rules that apply to vessels engaged in the incineration of liquid hazardous waste in bulk at sea.

Note: Regulations in 40 CFR part 234 require these vessels to obtain an ocean incineration permit from the Environmental Protection Agency.

§ 150.205 Definitions.

In this subpart:

Accommodation spaces means halls, dining rooms, lounges, lavatories, cabins, staterooms, office, hospitals, cinemas, game and hobby rooms, pantries containing no cooking appliances, and similar permanently enclosed spaces.

Approved means approved by Commandant (G-MTH), U.S. Coast Guard.

B means the breadth of the vessel and is defined in § 42.13-15(d) of this chapter.

Cargo means liquid hazardous waste that is carried in bulk for the purpose of incineration at sea and that is a hazardous material, as determined in § 153.40 of this chapter, with a vapor pressure of less than 172 kPa (25 psig) at 37.8°C (100°F).

Cargo area means that part of a vessel that includes the cargo tanks, spaces adjacent to the cargo tanks, and the part of the deck over the cargo tanks and adjacent spaces.

Cargo containment system means a cargo tank, its cargo piping system, its venting system, and its gauging system.

Cargo handling space means an enclosed space that must be entered during a routine loading, carriage, or burning of cargo and that contains an element of the cargo containment system having a seal or packing to prevent the escape of cargo, such as a valve or cargo pump.

Cargo piping system means an incinerator vessel's permanently installed piping arrangement, including any valves and pumps, that carries cargo to or from a cargo tank.

Closed gauging system means an arrangement for gauging the amount of cargo in a tank that does not have any opening through which cargo vapor or liquid can escape, and includes a float and tape, a magnetically coupled float and indicator, or a radar system.

Commandant means Commandant of the U.S. Coast Guard. The term is often followed by a mailing code in parentheses. The mailing address should include any mailing code and should be written as follows: Commandant (mailing code), U.S. Coast Guard Washington, DC 20593-0001.

Control space is defined in § 30.10-19a of this chapter.

Gas-tight means all openings into the space must have metal closures that do not leak when tested with a fire hose stream at a pitot pressure of 207 kPa gauge (30 psig).

IMO means the International Maritime Organization.

IMO Certificate means a Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk issued under the IMO Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, Resolution MEPC 20(22), 1985, as amended, or an International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk issued under the IMO International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code), Resolution MEPC 19(22), 1985, as amended.

Incinerator means a device, consisting of a burner assembly, combustion chamber, and stack, used to thermally break down hazardous waste.

Incinerator blower space means an enclosed space containing a blower that supplies combustion air to an incinerator.

Incinerator control room means a gas-tight space where controls, alarms, and monitoring systems for the incinerator operation are located.

Incinerator space means a cargo handling space surrounding the burner assembly portion of an incinerator, where waste is introduced into it.

Incinerator vessel means a tank vessel constructed or converted to carry and burn hazardous waste at sea.

Independent, as applied to a cargo piping, venting, or heating system means that the system is connected to no other system, and has no means available for connection to another system.

Independent tank means a cargo tank that is permanently affixed to the vessel, that is self-supporting, that incorporates no part of the vessel's hull, and that is not essential to the integrity of the hull.

Integral tank means a cargo tank that also is part of or is formed in part by the vessel's hull structure so that the tank and the hull may be stressed by the same loads.

L means the length of the vessel and is defined in § 42.13-15(a) of this chapter.

Liquid means each substance having a vapor pressure of 172 kPa or less at 37.8°C.

Master means the person-in-charge of a self-propelled or non-self-propelled incinerator vessel.

OCMI means *Officer in Charge, Marine Inspection,* as defined in § 1.05(b) of this chapter.

Pressure-vacuum (PV) valve means a valve that is normally closed and which opens under a preset positive pressure or a vacuum.

Separate and *separated,* as applied to a cargo piping, venting, heating or cooling system, means either an independent system or one that may be disconnected from all other systems by—

(1) Removing spool pieces or valves and blanking the open pipes ends; or

(2) Blocking each system interconnection with two blind flanges in series and providing a means of detecting leakage into the pipe section between the flanges.

Service space means a space outside the cargo area used for galleys, pantries containing cooking appliances, lockers, store room, workshops other than those forming part of the machinery spaces, and trunks to such spaces.

Venting System means a permanent piping arrangement leading from a cargo tank and used to control the flow of vapor to and from the tank.

§ 150.210 Incorporation by reference.

(a) Certain materials are incorporated by reference into this subpart with the approval of the Director of the Federal Register. To enforce any edition other than the one listed in paragraph (b) of this section, notice of the change must be published in the FEDERAL REGISTER and the material made available to the public. All approved material is on file at the office of the Federal Register, Washington, DC 20408, and at the U.S. Coast Guard, Marine Technical and Hazardous Materials Division (G-MTH), Washington, DC 20593.

(b) The materials approved for incorporation by reference in this subpart are:

American National Standards Institute, 1430 Broadway, N.Y, N.Y. 10018

ANSI B16.5-81, Pipe Flanges and Flange Fittings. This standard referenced in: § 150.480(a)(2).

ANSI B16.31-71, Non-Ferrous Pipe Flanges. This standard reference in: § 150.480(a)(2).

ANSI 287.1-79, Practice for Occupational and Educational Eye and Face Protection. This standard referenced in: §§ 150.395(g)(2) and 150.457(b)(2).

ANSI Z88.2-80, Practices for Respiratory Protection. This standard referenced in: §§ 150.395(h), 150.457(b)(3), and 150.460(b)(1).

National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 306-1984, Control of Gas Hazards on Vessels. This standard referenced in: § 150.460(b)(1).

§ 150.215 Non self-propelled vessels.

Each non-self-propelled incinerator vessel must meet the requirements of this subpart and any additional requirements that the Commandant (G-MTH) may prescribe.

§ 150.220 Inspection for certificate of inspection.

(a) Each incinerator vessel must be certificated under subchapter D of this chapter.

(b) During inspection for certification and reinspections held as provided in subchapter D of this chapter, cargo containment systems must be inspected for corrosion and the remaining wall thicknesses determined in accordance with the method prescribed for boiler in § 61.05-10(f) of this chapter.

§ 150.225 Required endorsement.

(a) Each incinerator vessel must have its subchapter D Certificate of Inspection endorsed as follows:

(1) "Inspected and approved for the carriage of Grade A and lower flammable or combustible liquids and hazardous waste for incineration"

(2) "Maximum specific gravity allowable: __________".

NOTE: Specific gravity is calculated in accordance with § 150.255(g).

(b) Each request for the endorsements required by this section must be submitted to one of the Coast Guard offices described in § 91.55-15 of this chapter.

(c) No incinerator vessel may load or carry cargo unless it has the endorsement required by this section.

(d) No endorsement will be issued unless the vessel meets the requirements of this subpart.

(e) The persons requesting an endorsement under paragraph (a) of this section must also transmit to the Coast Guard, when requested—

(1) Hull type calculations;

(2) The test procedure prescribed in § 150.370(b);

(3) The plans and information listed in § 150.295(g) and in § 54.01-18, § 56.01-10, § 91-55-5(a), (b), (d), (g), and (h), and § 110.25-1 of this chapter; and

(4) Any other vessel information, such as plans, design calculations, test results, certificates, and manufacturer's data needed to determine whether the vessel meets the requirements of this subpart.

§ 150.230 Carriage of bulk solid hazardous waste.

Bulk solid hazardous waste may not be carried on board an incinerator vessel.

§ 150.235 IMO Certificates for U.S. flag vessels.

(a) Subject to any amendments to the International Bulk Chemical Code, vessels that meet the requirements of this subpart are considered to meet the International Bulk Chemical Code requirements for obtaining an IMO Certificate of Fitness.

(b) Upon request made to the OCMI, the owner of an incinerator vessel may obtain an IMO Certificate of Fitness if the vessel has a valid Certificate of Inspection endorsed under § 150.225.

(c) The IMO Certificate of Fitness expires on the same date that the incinerator vessel's Certificate of Inspection expires.

NOTE: The IMO Certificate of Fitness is required for loading and transporting hazardous waste from most foreign ports for incineration at sea.

§ 150.240 Equivalent standards.

Procedures for requesting alternatives and waivers are provided in § 153.10 of this subchapter.

CONSTRUCTION AND ARRANGEMENTS

§ 150.245 Hull type and damage stability.

(a) Each incinerator vessel must have either a type I or type II hull as required for vessels which must comply with part 153 of this chapter.

(b) Each incinerator vessel must meet the applicable stability requirements in subpart F of part 172 of this chapter for a type I or type II hull.

§ 150.250 Electrical equipment.

(a) Each incinerator vessel must meet subchapter J of this chapter.

(b) Electrical equipment in an incinerator space or incinerator blower space that is not suitable for use in a Class I, Division 1 location or that does not meet the requirements of § 111.105 of this chapter must have interlocks sufficient to automatically de-energize the equipment upon ventilation system failure or loss of the pressure required by § 150.370.

§ 150.255 Cargo containment system.

(a) Each cargo containment system on a vessel must be no closer to the incinerator vessel's shell than 76 cm (approx. 29.9 in) and it may not be located in any part of the incinerator vessel subject to the damage described in Table 172.135 of this chapter for GROUNDING PENETRATION, Vertical extent from the baseline upward.

(b) Cargo piping must be located in those areas from which a containment system is excluded by paragraph (a) of this section unless the cargo piping:

(1) Drains back to its cargo tank under any condition of heel or trim resulting from the damage specified in § 172.135 of this chapter; and

(2) Enters the cargo tank above the liquid level for a full tank in any condition of heel or trim resulting from the damage specified in § 172.135 of this chapter.

(c) The cargo piping system must not be connnected to any sea valve.

(d) Fuel piping and cargo piping may be connected to one common pipe leading into an incinerator burner only if the point of connection has a three-way valve having at least "fuel", "cargo", and "off" positions. The fuel piping must include two automatic non-return valves with positive means of closure, or an equivalent arrangement. These valves must be located in the incinerator space.

(e) A cargo tank's relief valve setting must be not less than 21 kPa gauge (approx. 3 psig).

(f) All cargo pumps and valves located below the weatherdeck must be operable from on or above the weatherdeck.

(g) The cargo must be separated from any bunkers by at least two bulkheads, except that an oil fuel tank containing oil fuel used exclusively in the incineration process may be adjacent to a cargo tank.

(h) A tank containing liquid used for washing cargo tanks and cargo piping may be adjacent to a cargo tank.

(i) Each cargo containment system must be designed to withstand the maximum pressure that develops during an overfill of cargo having the maximum specific gravity endorsed on the vessel's Certificate of Inspection.

(j) Each independent tank must meet the following requirements:

(1) Section 38.05-10(a)(1), (b), (d), and (e)(1) of this chapter.

(2) Its piping must penetrate the tank only through that part of the tank or dome extending above the weatherdeck.

(k) A cargo tank may be an integral tank.

(l) A cargo tank must have at least one covered manhole opening into the vapor space described in § 150.295

(m) An access trunk must be no less than 76 cm (approx. 29.9 in.) in diameter.

(n) The hatch of a cargo tank must:

(1) Be at the highest point of the tank; and

(2) Open on or above the weatherdeck.

(o) Aluminum, copper, alloys, zinc, galvanized steel, mercury and materials of construction having a melting point below 925° C (Approx. 1697° F) may not be used in the construction of a cargo containment system.

(p) Each cargo piping system must meet the the standards of Part 56 and §§ 38.10-1(b), 38.10-1(e), and 38.1-10(a) of this chapter.

(q) Piping carrying cargo or cargo residue may not enter any machinery space except a cargo pumproom.

(r) Unless corrosion resistant materials are used, the corrosiveness of the cargo must be used to evaluate the corrosion allowance to be added to the calculated thickness when determining the scantlings of cargo containment systems.

§ 150.260 Separation of tanks from machinery, service and other spaces.

(a) To prevent leakage through a single weld failure, the following spaces must be separated from a cargo by two walls, two bulkheads, or a bulkhead and a deck not meeting in a cruciform joint:

(1) Machinery spaces.

(2) Service spaces.

(3) Accommodation spaces.

(4) Spaces for storing potable domestic or feed water.

(5) Spaces for storing edibles.

(b) Some examples of arrangements that may separate cargo from the spaces listed in paragraph (a) of this section are the following:

(1) Dedicated ballast tanks.

(2) Cargo pumprooms.

(3) Ballast pumprooms.

(4) Double walled piping or a piping tunnel.

§ 150.265 Fore and aft location.

Each cargo containment system must be located at least 0.05L aft of the forward perpendicular, but in no case forward of a collision bulkhead.

§ 150.270 Vessel arrangements.

(a) The following must be outside the cargo area:

(1) Accommodation spaces.

(2) Service spaces.

(3) Incinerator spaces.

(4) Control spaces.

(5) Incinerators.

(6) Machinery spaces.

(7) Incinerator control rooms.

(b) Except as allowed in paragraph (c) of this section, entrances, ventilation intakes and exhausts, and other openings to accommodation, service, or control spaces, must be located at a distance from the athwartship bulkhead facing the cargo area that is at least equal to the following:

(1) 3 m (approx. 10 ft) if the vessel is less than 75 m (approx. 246 ft) in length.

(2) L/25 if the vessel is between 75 and 125 meters (approx. 246 ft and 410 ft) in length.

(3) 5 m (approx 16.5 ft) if the vessel length is more than 125 m (approx. 410 ft) in length.

(c) Fixed port lights, wheelhouse doors, and windows need not meet the location requirements specified in paragraph (b) of this section if they are gastight.

(d) Portlights in the hull plating below the uppermost continuous deck and in the first tier of the superstructure must be a fixed type.

(e) Air intakes and openings into accommodation and service spaces must have metal closures that are gastight.

(f) The closures required by paragraph (e) of this section must be capable of being closed from inside the space.

(g) Each oil fuel containment system must be located inside the cargo area unless the fuel has a closed cup flashpoint above 60° C (140° F).

(h) The containment system for liquids used for washing cargo tanks or cargo piping must be located inside the cargo area.

(i) Pumproom bilge discharges and cargo tank and piping washings must be stored in a slop tank in the cargo area until incinerated or discharged to a reception facility. A cargo tank may be used as a slop tank.

(j) Each incinerator must be positioned in a manner approved by Commandant (G-MTH) for that vessel.

§ 150.275 Ballast equipment.

(a) Except for the arrangement described in paragraph (b) of this section, no piping that serves a dedicated ballast tank that is adjacent to a cargo tank may enter an engine room or accommodation space.

(b) Piping used only to fill a dedicated ballast tank adjacent to a cargo tank may enter an engine room or accommodation space if the piping has a valve or valving arrangement—

(1) Within the part of the incinerator vessel where a containment system may be located under § 150.265;

(2) That allows liquid to flow only towards that ballast tank (such as a check valve); and

(3) That enables a person to shut off the fill line from the weatherdeck (such as a stop valve).

(c) Except as prescribed in paragraph (d) of this section, pumps piping, vent lines, overflow tubes, and sounding tubes serving dedicated ballast tanks must not be located within a cargo containment system.

(d) Each vent line, overflow tube, and sounding tube that serves a dedicated ballast tank and that is located within a cargo containment system must meet § 32.60-10(e)(2) of this chapter.

§ 150.280 Bilge pumping system.

Bilge pumping systems for cargo pumprooms, slop tanks, and void spaces separated from cargo tanks by only a single bulkhead must be entirely within the locations where containment systems are permitted under § 150.265.

§ 150.285 Access to enclosed spaces and dedicated ballast tanks.

An access opening to an enclosed space or a dedicated ballast tank must meet the requirements for a cargo tank access in § 150.225(i), (j), and (k) if:

(a) The enclosed space or dedicated ballast tank is located within the cargo area of the vessel; or

(b) A part of a cargo containment system lies within the enclosed space or dedicated ballast tank.

§ 150.290 Access to double bottom tanks serving as dedicated ballast tanks.

(a) Except as prescribed in paragraph (b) of this section, access openings to double bottom tanks serving as dedicated ballast tanks must not be located within a cargo containment system.

(b) Each access opening to a double bottom tank that is a dedicated ballast tank and that is located within a cargo containment system must be:

(1) Enclosed in an access trunk extending to the weatherdeck

(2) Separated from the cargo containment system by two manhole coverings; or

(3) Approved by the Commandant (G-MTH).

§ 150.295 Cargo venting system.

(a) Except as permitted paragraph (c) of this section, each cargo venting system must discharge—

(1) At the highest of the following points:

(i) 6 m (approx. 19.7 ft) above the weatherdeck.

(ii) B/3 above the weatherdeck.

(iii) 6 m (approx. 19.7 ft) above a walkway, if the walkway is within 6m (19.7 ft) horizontal radius from the vent discharge.

(2) At least 15 m (approx. 49.2 ft) from air intakes for, or openings into, accommodation and service spaces.

(b) Each venting system outlet must—

(1) Discharge vertically upwards; and

(2) Prevent precipitation from entering the vent system.

(c) The discharge point of the venting system must be located at least 3 m (10ft) above the weatherdeck or walkway if—

(1) The discharge is a vertical unimpeded jet;

(2) The jet has a minimum exit velocity of 30 m/sec. (approx. 98.4 ft/sec); and

(3) The high velocity vent has been approved by Commandant (G-MTH).

(d) Each venting system must terminate in the vapor space above the cargo when the cargo tank is filled to a 2 percent ullage and the incinerator vessel has no heel or trim.

(e) Each cargo tank must have a PV valve in its vent line. The PV valve must be located between the tank and any connection to another tank's vent line (such as a vent riser common to two or more tanks).

(f) The cross sectional flow area of any vent system segment, including any PV valve, must at no point be less than that of a pipe whose inside diameter is 6.4 cm (approx. 2.5 in.).

(g) Calculations must show that under conditions in which a saturated cargo vapor is discharged through a venting system at the maximum anticipated loading rate, the pressure differential between the cargo tank vapor space and the atmosphere does not exceed 28 kPa gauge (approx. 4 psig), or, for independent tanks, the maximum working pressure of the tank.

(h) A venting system must have no assembly that could reduce its cross-sectional flow area or flow capacity to less than that required in paragraph (f) of this section.

(i) Unless a cargo venting system at every point is level or slopes back to the cargo tank under all conditions or heel and trim allowed under § 150.505 of this chapter, the cargo vent system must have a drain valve at each low point (trap) in the vent line.

(j) Supports for a vent system must be adequate to take the weight of the vents off valves and fittings and to prevent excessive vibration and stresses on tank connections.

(k) Each pressure-vacuum relief valve must meet the requirements of Subpart 162.017 of this chapter.

(l) A cargo vent header, except a high velocity vent described in paragraph (c) of this section, must have a flame arrestor.

§ 150.300 Cargo tank gauging, Tank Overflow Control, High Level Alarms.

In this section, "Independent", as applied to two systems, means that one system will operate with a failure of any part of the other system.

(a) Each cargo containment system must have—

(1) A permanently installed closed gauging system that is independent of the high level alarm and the cargo overflow alarm or automatic shutdown systems, which are required by this section;

(2) A vapor return connection;

(3) A closed cargo sampling system; and

(4) A high level alarm—

(i) That gives an audible and visible alarm before the tank fills to 97 percent of its capacity;

(ii) That can be seen and heard at the location where cargo transfer is controlled and on the open deck;

(iii) Whose operation can be checked prior to each loading; and

(iv) That must be marked "HIGH LEVEL ALARM" in lettering as specified for the warning sign in § 150.490, so that the legend is visible from work areas in the part of the deck where the cargo containment systems are located.

(b) In addition to the cargo high level alarm meeting paragraph (a)(4)(i)-(iv), each cargo containment system must have:

(1) A second high level (cargo overflow) alarm, or

(2) A system that automatically stops cargo flow to the tank (automatic shutdown system).

(c) The high level alarm and the cargo overflow alarm or automatic shutdown system must—

(1) Be independent of one another; and,

(2) Operate on loss of power.

(d) The cargo overflow alarm or the automatic shutdown system must operate early enough to—

(1) Stop the loading operation before the cargo tank overflows; and

(2) Avoid surge pressures that exceed the working pressure of the cargo piping system as prescribed in § 38.10-10(a) of this chapter.

(e) A tank overflow must be identified with the legend "TANK OVERFLOW ALARM" in lettering as specified for the warning sign in § 150.490.

(f) A tank overflow alarm must be audible and visible in that part of the deck where the containment systems are located and at the point where cargo loading is controlled.

(g) The automatic shutdown system or tank overflow alarm must be able to be checked at the tank for proper operation (for example, by electrically simulating an overfill at the tank gauge connections).

§ 150.305 Access to a cargo pumproom.

(a) The access door to a cargo pumproom must open onto the weatherdeck.

(b) The access way to a cargo pumproom and its valving must allow passage of a man wearing the breathing apparatus required by § 150.395(a)(2)(i).

(c) Each ladderway in a cargo pumproom must be free from obstructions by piping, framework, or other equipment.

(d) Cargo pumproom ladders and platforms must have guard railings.

(e) Each ladder to a cargo pumproom must have an incline from the horizontal of less than 60°.

§ 150.310 Hoisting arrangement.

(a) A cargo pumproom located below the weatherdeck must have a permanent hoisting arrangement with a lifting capacity of 2500 N (approx. 562 lbs) operable from a weatherdeck, for the removal of an unconscious person.

(b) A cargo pumproom located below the weatherdeck must have a 60 cm by 60 cm (approx. 2 ft by 2 ft) cross-sectional clearance through the hoistway.

§ 150.315 Cargo pump discharge pressure gauge.

Each cargo pump within a pumproom must have a discharge pressure gauge outside the pumproom.

§ 150.320 Bilge pumping systems.

(a) A cargo pumproom must have a bilge pumping system.

(b) The bilge pumping system must have—

(1) Complete remote operating controls outside the cargo pumproom; and

(2) An alarm that operates when the depth of liquid in the bilges exceeds 50 cm (approx. 20 in.).

(c) The discharge piping of the bilge pumping system must not be connected to any sea valve.

§ 150.325 Pumproom respiratory requirements.

(a) Each cargo pumproom must have a low pressure air supply system that provides breathing quality air for use with the breathing apparatus in the pumproom.

(b) The low pressure air supply system described in paragraph (a)(1) of this section must—

(1) Run from fixed air bottles to the pumproom;

(2) Have an air compressor to recharge the fixed air bottles;

(3) Have connections in the pumproom suitable for use with the breathing apparatus required in § 150.395(a)(2)(i); and

(4) Have the air capacity to enable two men to work in the pumproom for at least one hour each without using the cartridges for the breathing apparatus required in § 150.395(a)(2)(i).

INCINERATOR AND CONTROLS

§ 150.330 Incinerator construction.

(a) Each incinerator stack must be constructed of steel with enough bricklining and insulation so that the temperature on its outside surface does not exceed 180°C (356°F) during burning.

(b) Calculations must show that the incinerator, including its structural supports, is designed to withstand a static angle of heel of 30° and the dynamic loading prescribed in § 38.05-2(d) of this chapter.

(c) A guard rail or screen must be installed on deck around the exterior of each incinerator stack at a sufficient distance from the stack and with enough protective covering or insulation to prevent personnel injury during burning. In determining the distance and insulation, the outside surface temperature of the incinerator stack must be taken as 180°C (356°F).

§ 150.335 Incinerator control and monitoring: general.

(a) Each incinerator must have—

(1) Monitoring and alarms that meet § 150.340;

(2) Combustion control that meets § 150.345;

(3) Programming control that meets § 150.350;

(4) Safety trip control that meets §§ 150.335 and 150.360.

(b) Systems that perform the functions listed in paragraphs (a)(1) through (a)(4) of this section must perform all assigned tasks continuously, *i.e.*, the detection of unsafe conditions must not prevent continued control of monitoring of other conditions.

(c) Inadvertent grounding of an electrical or electronic control or alarm system must not cause false signals or safety trip control bypassing.

(d) Programmable control or alarm system logic must not be altered after initial testing without the approval of the cognizant OCMI. Control and automatic alarm systems must be provided with means, acceptable to the cognizant OCMI, of ensuring that setpoints remain within the safe operating range of the equipment.

(e) Operating programs for microprocessor-based or computer-based control, alarm and monitoring systems must—

(1) Be stored in non-volatile memory;

(2) Automatically operate on supply power resumption; and

(3) Not rely on mechanical devices.

(f) All incinerator controls and all alarm and monitoring equipment must be of a type suitable for the marine environment and its intended application, and be designed and constructed to operate indefinitely under the following conditions:

(1) Inclinations from the vertical—

(i) Static 15° list; and

(ii) Dynamic 22.5° roll and simultaneous 7.5° pitch.

(2) Temperatures of—

(i) 0°C to 60°C in enclosures;

(ii) 0°C to 50°C in machinery spaces and spaces with forced cooling;

(iii) −40°C to +55°C on weather decks; and

(iv) 0°C to 40°C otherwise.

(3) System supply variations of—

(i) ±10% voltage;

(ii) ±5% frequency; and ±20% fluid pressure.

NOTE: Considerations should include normal dynamic conditions that might exceed these values, such as switching, valve closure, power supply transfer, starting, and shutdown.

(4) Relative humidity of 0 to 100%.

(5) Vibrations and accelerations of—

(i) ±1.6mm from 2Hz to 25Hz and ±4g from 25 Hz to 100 Hz for equipment mounted on or adjacent to rotating or reciprocating machinery; and

(ii) ±1mm from 2 Hz to 13.2 Hz and ±0.7g from 13.2 Hz to 80 Hz for all other equipment.

(g) All control systems must be so designed that, as far as practicable, failure of equipment causes safe and immediate incinerator shutdown.

(h) Safety trip controls must require manual reset before renewed operation of the incinerator.

(i) Each pipe leading to an incinerator burner, if that pipe carries fuel or cargo or both, must be provided with a burner valve that is operated by the programming controls and automatically closed by the burner safety trip control and the incinerator safety trip control. Each incinerator burner must also be provided with one or more back-up valves to stop flow of fuel and cargo to the incinerator upon actuation by the incinerator safety trip control. Burner back-up valve shutoff must occur within 4 seconds of the detection of an unsafe condition or operation of an emergency shutdown station control. These valves must also be manually operable at the incinerator.

(j) Low voltage electronics must be designed with due consideration for static discharge, electromagnetic interference, fungal growth, and contact corrosion.

§ 150.340 Incinerator monitoring and alarms.

(a) Operation of a safety trip control described in §§ 150.355 and 150.360 must be alarmed at the incinerator space and the incinerator control room, if any; otherwise, in the vessel's control space.

(b) Manual incinerator control locations, including remote manual control and local manual control, must be provided with the instrumentation necessary for safe operation from that location.

(c) Visual alarm displays must initially indicate the malfunction without operator intervention.

(d) If the remote instrumentation installed does not provide a continuous display, readings must be obtainable with minimal effort by the operator.

(e) Failure of an incinerator automatic control, remote control, or alarm system must be immediately alarmed in the incinerator space, the incinerator control room, and in the vessel's control space.

(f) Alarms must be provided in each incinerator space to indicate failure to maintain the pressure differential required by § 150.370(c) of this chapter.

(g) Alarms must also be provided to indicate when temperature on the surface of the incinerator exceeds 180 °C (356 °F) during burning. The alarms must be in each incinerator control room and in the vessel's control space.

(h) If a cargo tank is required to be inerted under § 150.410, alarms must be provided to indicate when the pressure in the vapor space of an inerted cargo tank is less than 0.07 bar gauge (7 kPa, approx. 1 psig). An alarm must be in each incinerator control room and in the vessel's control space.

(i) All alarm systems must—

(1) Have no means to reduce or eliminate the annunciated signal other than the manual acknowledgement device;

(2) Be continuously powered;

(3) Be provided with a means to test audible and visual annunciators;

(4) Be able to simultaneously indicate more than one alarm condition if multiple inputs are provided:

(5) Visually annunciate until the alarm is manually acknowledged and the alarm condition is cleared;

(6) Audibly annunciate until manually acknowledged;

(7) Not prevent annunciation of subsequent alarms because of previous alarm acknowledgement;

(8) Automatically reset to the normal operating condition only after the alarm has been manually acknowledged and the alarm condition is cleared; and

(9) Clearly distinguish between normal, alarm, and acknowledged alarm conditions.

§ 150.345 Combustion control.

(a) Automatic combustion control must provide the air-fuel-cargo relationships necessary for complete and safe combustion under all normal light-off and operating conditions, but in no case less than 3% excess air.

(b) If combustion control is not automatic, the programming controls and safety trip control must provide a level of safety equivalent to automatic combustion control.

§ 150.350 Programming control.

Programming control must provide a specific sequence of interlocks for the safe ignition and normal shutdown of the incinerator burners. The programming control must prevent ignition if unsafe conditions exist and must include the following minimum sequence of events and interlocks:

(a) *Prepurge.* Incinerators must undergo a continuous purge of the combustion chamber to make sure of a minimum of 5 changes of air. The purge must occur immediately prior to the trial for ignition of fuel oil in the initial burner of an incinerator. All registers and dampers must be open. The prepurge must be complete before fuel oil trial for ignition of the initial burner.

(b) *Trial for ignition and ignition of fuel oil.* Total incinerator air flow during light off must provide an air-rich combustion chamber atmosphere. The burner igniter must be in position and proven energized before admission of fuel to the incinerator. The igniter must remain energized until the burner flame is established and stable, or until the trial for ignition period ends. The trial for ignition period must not exceed 5 seconds. Failure of the burner to ignite during a trial for ignition must automatically actuate the burner safety trip controls.

(c) *Post-purge.* Immediately after normal shutdown of the incinerator, an automatic purge of the incinerator equal to the volume and duration of the prepurge must occur. Following shutdown caused by the conditions listed in § 150.360, the air flow to the incinerator must not automatically increase. Post-purge in such cases must be under manual control.

§ 150.355 Incinerator burner safety trip control.

(a) Each burner must be provided with at least one flame detector.

(b) The burner fuel oil and cargo valves must automatically close when—

(1) Loss of burner flame occurs;

(2) Actuated by the incinerator safety trip control;

(3) The burner is not properly seated or in place;

(4) Trial for ignition fails; or

(5) The burner flame detector fails.

§ 150.360 Incinerator safety trip control.

Each incinerator must be provided with a safety trip control that automatically closes its burner fuel and cargo valves upon—

(a) Inadequate air flow to support complete combustion;

(b) Loss of control power;

(c) Manual trip operation in the incinerator space or the emergency shutdown station of § 150.390(c);

(d) Loss of flame at all burners; or

(e) Control system failure.

§ 150.365 Operating instructions and test procedures.

(a) Normal and emergency operating instructions must be provided for all remote and automatic control systems, and must include safety precautions, as applicable. Specific emergency operating instructions must be posted at incinerator control locations.

(b) A written Coast Guard approved test procedure for periodically verifying the operational conditions required by §§ 150.335 through 150.360 must be retained aboard the vessel.

§ 150.370 Ventilation of cargo handling spaces, incinerator spaces and incinerator blower spaces.

(a) Except as provided in paragraphs (c) and (d) of this section, each cargo handling space must have a permanent forced exhaust ventilation system.

(b) Except as provided in paragraph (d) of this section, each cargo handling space ventilation system must meet the following:

(1) Each ventilation system exhaust duct must discharge no less than 10 m (approx. 32.8 ft) from openings into, or ventilation intakes for, accommodation or service spaces.

(2) Each ventilation system must not recycle vapors from ventilation discharges.

(3) Except for the space served by the ventilation duct, each ventilation duct must not pass through a machinery room, an accommodation space, or working space.

(4) Each ventilation system must be operable from outside the space it ventilates.

(5) Each ventilation system must be sized to change the air in the ventilated space at least 45 times per hour.

(6) Each ventilation system must not allow air to stagnate in any part of a ventilated space

(7) Each ventilation system must be able to exhaust air from both above and below the deck plates of a ventilated space.

(c) The ventilation system for an incinerator space must be permanent, be of a positive pressure type, and keep the pressure in the space greater than the pressure in the incinerator.

(d) The ventilation system for an incinerator blower space must be permanent, be of a positive pressure type, and be independent of other air supply systems and the ventilation system—

(1) Must provide a pressure greater than the pressure within the incinerator; and

(2) Must change the air in the space at least 20 times per hour based on the total volume of the incinerator blower space.

§ 150.375 Ventilation of spaces not usually occupied.

(a) Each incinerator vessel must have portable ventilation equipment that fits the mount required in paragraph (b)(1) of this section.

(b) Each enclosed space within the cargo area that does not have a permanent ventilation system meeting § 150.370(b) must have—

(1) A mount for the portable mechanical ventilation equipment required by this section; and

(2) Either permanent ventilation ductwork connected to the mount and arranged to supply air to the extremities of the space; or

(3) An attachment for temporary ductwork at the mount with enough ductway in the ventilated space and temporary ductwork stowed aboard the vessel to supply air to the extremities of the space.

§ 150.380 Incinerator space access.

(a) Two accesses must be provided to each incinerator space. One of these must be from the weather deck. If an incinerator control room is provided adjacent to the incinerator space, it must have at least one access to the weatherdeck and at least one access that is not to the incinerator space.

(b) Each access opening to an incinerator space must be fitted with a self-closing gas tight door.

§ 150.385 Incinerator blower space.

If an incinerator blower space has access to an incinerator space, it must also have access to the weatherdeck.

EQUIPMENT AND OPERATIONS

§ 150.390 Emergency shutdown stations.

(a) Each incinerator vessel must have at least two emergency shutdown stations.

(b) One emergency shutdown station must be located in the vessel's navigating bridge.

(c) The second emergency shutdown must be located in the incinerator control room.

(d) Each emergency shutdown station must have the controls necessary to stop—

(1) All pumps supplying cargo and oil fuel to the incinerator; and

(2) The flow of cargo from the cargo area.

(e) Each emergency shutdown station must be marked as described in § 150.490 (c), (d), and (e) with the legend "EMERGENCY SHUTDOWN STATION".

§ 150.395 Personnel emergency and safety equipment.

(a) Each incinerator vessel must have the following:

(1) Two stretchers or wire baskets complete with equipment for lifting an injured person from a pumproom or a cargo tank.

(2) In addition to any similar equipment required by subchapter D of this chapter, three each of the following:

(i) A 30 minute self-contained breathing apparatus of the pressure demand type, approved by the Mining Safety and Health Administration (formerly the Mining Enforcement and Safety Administration) and the National Institute for Occupational

Safety and Health, with five refill tanks or cartridges of 30 minutes capacity each.

(ii) A set of coveralls or large apron, boots, long sleeved gloves, and goggles, each made of materials resistant to the cargo endorsed on the Certificate of Inspection.

(iii) A steel-cored lifeline with harness.

(iv) An explosion-proof lamp.

(3) First aid equipment including oxygen resuscitators.

(b) Each incinerator vessel must have at least two safety equipment lockers.

(c) One safety equipment locker must be adjacent to the emergency shutdown station required by § 150.390(b). This locker must contain one set of the equipment required by paragraph (a)(1) of this section and two of the sets required by paragraph (a)(2) of this section.

(d) The second safety equipment locker must be adjacent to the second emergency shutdown station required by § 150.390. This locker must contain the remaining equipment required by paragraphs (a) (1) and (2) of this section.

(e) Each safety equipment locker must be marked as described in § 150.490 (c), and (d) with the legend "SAFETY EQUIPMENT."

(f) Each incinerator vessel must have a shower and an eyewash fountain that:

(1) Operate in any ambient temperature;

(2) Maintain the water at a temperature between 0 °C and 40 °C (approx 32 °F and 104 °F);

(3) Are located on the weatherdeck; and

(4) Are marked "EMERGENCY SHOWER" so that the legend is visible from work areas in the part of the deck where the cargo containment systems are located.

(g) Each incinerator vessel must have on board for each crew member:

(1) A fifteen minute or greater self-contained compressed air breathing apparatus for emergency escape approved by the Mining Safety and Health Administration (formerly the Mining Enforcement and Safety Administration) and the National Institute for Occupational Safety and Health.

(2) If the emergency escape breathing apparatus does not protect the eyes from vapor, a set of goggles that meets the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z87.1(1979).

(h) Each incinerator vessel must have a comprehensive respiratory program meeting ANSI Practices for Respiratory Protection, Z88.2(1980) including approval, use, and maintenance of all respiratory equipment.

§ 150.400 Special requirements for fire protection.

(a) With the exception of the vent riser, each part of a cargo containment system exposed on the weatherdeck must be covered by a fixed foam system.

(b) The incinerator space must be fitted with a fixed foam system. The area protected must meet the requirements of § 34.17-5(a)(1) of this chapter.

(c) Each fire protection system required by this section must meet Part 34 of this chapter or be specifically approved by the Commandant (G-MTH).

§ 150.402 Flammable vapor detectors.

(a) Each incinerator vessel must have two vapor detectors that meet 35.30-15(b) of this chapter.

(b) At least one of the vapor detectors in paragraph (a) of this section must be portable.

§ 150.403 Toxic vapor detectors.

If available for the cargo carried, each incinerator vessel must have two toxic vapor detectors able to measure vapor concentrations in the range of the time weighted average (TWA) for the cargo. One of the vapor detectors must be portable and may be a direct reading detector tube instrument. These vapor detectors may be combined with those required by § 150.402 of this subpart.

§ 150.405 Inert gas system: General.

A permanent inert gas system must be provided for—

(a) Each cargo tank having a fill or circulation line that terminates higher than 10cm or the radius of the line above the bottom of the tank, whichever is greatest; and

(b) Each cargo tank washed with flammable or combustible solutions.

§ 150.410 Inert gas system: Specific requirements.

When required by § 150.405, an inerting system must—

(a) Maintain tne vapor space of the containment system in an inert state;

(b) Have a pressure control system that—

(1) Prevents the inert gas system from raising the cargo tank pressure to more than the relief valve settings; and

(2) Maintains at least a 3.5 kPa gauge (approx. 0.5 psig) pressure within the containment system.

(c) Has storage or generating capacity for enough inerting gas to replace that normally lost through tank breathing and relief valve leakage, but in no case an amount less than five percent of the tank's capacity when measured with the gas at −18 °C (approx. 0 °F) and a pressure equal to the cargo tank's relief valve setting; and

(d) Has connections for any supplemental gas supply necessary to maintain the inert gas pressure described in paragraph (b) of this section while supplying cargo to the incinerator for burning.

§ 150.415 Certificates required to be on bridge.

Each incinerator vessel must have its endorsed Certificate of Inspection posted on the bridge.

§ 150.420 Limitation in the endorsement.

No person may operate an incinerator vessel unless the vessel is operated in compliance with all limitations in the endorsement on the incinerator vessel's Certificate of Inspection.

§ 150.425 Regulations required to be on board.

No person may operate an incinerator vessel unless the most recent editions of this subpart and subchapter D of this chapter are on board.

§ 150.430 Shipping documents and cargo information.

(a) No person may operate an incinerator vessel without copies of the EPA Uniform Hazardous Waste Manifest (EPA Form 8700-22 and 8700-22a) required in 40 CFR 262 and the waste analysis required in 40 CFR 234.58 both being on the bridge of the vessel.

(b) The master shall ensure that the following information for each cargo listed on the EPA Uniform Hazardous Waste Manifest required in paragraph (a) of this section is readily available to those persons on the incinerator vessel engaged in cargo operations:

(1) Name of the cargo as listed on the EPA Uniform Hazardous Waste Manifest.

(2) A description of the cargo's appearance and color.

(3) Hazards in handling the cargo.

(4) Any special handling procedures for the cargo.

(5) Procedures to follow if the cargo spills or leaks.

(6) Procedures for treating a person exposed to the cargo.

(7) A list of fire fighting procedures and extinguishing agents effective with cargo fires.

(8) Loading point.

(9) Approximate quantity of cargo.

(10) Tank in which the cargo is located.

§ 150.432 Cargo antidotes.

No person may operate an incinerator vessel unless the vessel has on board the most recent edition of the *Medical First Aid Guide for Use in Accidents Involving Dangerous Goods* published by IMO/WHO/ILO.

§ 150.435 Cargo piping plan.

No person may operate an incinerator vessel unless the vessel has an approved cargo piping plan that—

(a) Shows all cargo piping on the vessel;

(b) Shows all cargo valving, pumps and other equipment that is used during cargo transfer;

(c) Shows the cargo tanks;

(d) Shows any modification necessary to any cargo containment system that is to be separated from other cargo containment systems to handle cargo that is incompatible with cargo handled in the other systems; and

(e) Emphasizes the piping and equipment described in paragraphs (a), (b) and (d) of this section by using contrasting colors, line widths or similar methods.

§ 150.440 Cargo quantity limitations.

No person may load a cargo tank or operate an incinerator vessel that carries a cargo tank containing in excess of 3000 m^3 (approx. 105,932 ft^3) of cargo.

§ 150.445 Inerting system operation.

The master shall ensure that the inert gas system required by § 150.405(a) is in use and operating correctly.

§ 150.450 Eye protection.

(a) The master shall ensure that each person wears a face mask or tight fitting goggles for eye protection against splashing or spraying cargo if that person is—

(1) Sampling cargo;

(2) Transferring cargo;

(3) Making or breaking a cargo hose connection; or

(4) Opening a cargo tank for purposes of tank cleaning by opening a Butterworth hatch, ullage hatch, cargo tank hatch, or similar opening.

(b) The master shall ensure that each person wears a face mask or tight-fitting goggles for eye protection against splashing or spraying cargo if the person is—

(1) In the area of the deck where the cargo tanks, cargo piping, and cargo handling spaces are located while a cargo transfer is taking place; or

(2) In a cargo handling space, an enclosed space adjacent to a cargo tank, or a space containing part of a cargo containment system while cargo transfer is taking place.

§ 150.455 Protective clothing.

(a) The master shall ensure that every person in the cargo area who is involved in cargo sampling, opening a cargo tank, transferring cargo, or making or breaking cargo connections wears coveralls or a large apron, boots, and gloves.

(b) The master shall ensure that each person described in § 150.450(b), in addition to the clothing required by paragraph (a) of this section, wears any other protective clothing the master believes necessary to protect the person from the cargo's hazards.

§ 150.457 Entry on deck in vicinity of incinerators.

(a) No person may be on deck in the aft part of the vessel during burning without the permission of the master.

(b) Before permitting a person on deck in the vicinity of the incinerators during burning, the master shall make sure that the person—

(1) Carries a fifteen minute or greater self-contained compressed air breathing apparatus for emergency escape approved by the Mining Safety and Health Administration (formerly the Mining Enforcement and Safety Administration) and the National Institute for Occupational Safety and Health;

(2) If the emergency escape breathing apparatus does not protect the eyes from vapor, carries a set of goggles that meets the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z87.1(1979);

(3) Is trained in the matters set forth in section 7 of ANSI Z88.2 concerning proper use of the equipment to be used;

(4) Is made aware of, in understandable terminology, of the dangers of heat from the stack and the effects of exposure to the incinerator stack emissions; and

(5) While on deck in the aft part of the vessel in the vicinity of the incinerators, is closely monitored by an officer assigned for that purpose.

§ 150.460 Entry into spaces containing cargo vapor.

(a) No person may enter a cargo tank, cargo handling space, or enclosed space in the cargo area without the permission of the master.

(b) Before permitting anyone to enter a cargo tank, cargo handling space, or other enclosed space in the cargo area, the master shall make sure that—

(1) The atmosphere of the space is tested in accordance with procedures in NFPA 306, "Control of Gas Hazards on Vessels" to ensure that it contains at least 19.5 percent oxygen by volume, flammable concentration in air less than 10% of the Lower Explosive Limit (LEL), and toxic contaminant concentrations less than the Threshold Limit Value (TLV) as recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), or, in the alternative, that those entering the space

(i) Wear the type of respiratory equipment required for the atmosphere as specified in ANSI Z88.2;

(ii) Follow the procedures in section 6 of ANSI Z88.2 concerning proper selection of a respirator and individual fit testing;

(iii) Are trained in the matters set forth in section 7 of ANSI Z88.2 concerning proper use of the equipment to be used; and

(iv) Are made aware of, in terminology understandable to the personnel entering the atmosphere, of the generally recognized short and long term harmful effects of exposure to the atmosphere involved.

(2) A deck safety watch is in attendance when any person is in the tank or space and that an officer closely supervises the entire operation; and

(3) The results of the test required in paragraph (b)(1) of this section are logged in the vessel's Official Log Book.

§ 150.465 Opening of tanks and cargo sampling.

(a) Except as provided by paragraph (b) of this section, the master shall ensure that all cargo tank hatches, ullage openings, and tank cleaning openings are tightly closed at all times.

(b) The master may authorize the opening of a cargo tank to clean it.

(c) The master shall make sure that cargoes are sampled only through the controlled sampling arrangement required by § 150.300 of this chapter.

§ 150.470 Storage of cargo samples.

(a) The master shall make sure that any cargo samples are stored in—

(1) A designated and ventilated space in the cargo area of the vessel; or

(2) An area approved by the Commandant (G-MTH) for the stowage of cargo samples.

(b) The master shall make sure that cargo sample bottles are stored—

(1) In a way that prevents shifting of the sample bottles when the vessel is at sea;

(2) In bins or containers constructed of materials that are resistant to the cargo samples; and

(3) Apart from other sample bottles containing incompatible cargo.

§ 150.475 Illness, alcohol, drugs.

The master shall ensure that no person participates in cargo related operations who appears to be intoxicated by alcohol or drugs or to be so ill as to be unfit for the particular operation.

§ 150.480 Standards for marking of cargo hose carried onboard.

No person may mark a hose assembly used to transfer cargo to or from a vessel as meeting the standards of this section unless the hose assembly meets the following requirements:

(a) Each hose assembly must have—

(1) Fully threaded connections;

(2) Flanges that meet standard B16.5, Steel Pipe Flanges and Flange Fittings, or standard B16.31, Nonferrous Pipe Flanges, of the American National Standards Institute; or

(3) Quick-connect couplings that are acceptable to the Commandant (G-MTH).

(b) Each hose assembly must be marked with the—

(1) Date of manufacture;

(2) Working pressure described in paragraph (d) of this section;

(3) Date of the last test made as prescribed in paragraph (e) of this section; and

(4) Manufacturer's recommended maximum and minimum temperatures.

(c) A cargo hose assembly must have a minimum bursting pressure as stated by the manufacturer of at least 5152 kPa gauge (approx. 750 psig).

(d) The working pressure marked on a hose must meet the following:

(1) Be at least 1030 kPa gauge (approx. 150 psig).

(2) Not exceed 20 percent (one fifth) of the manufacturer's stated bursting pressure.

(3) Not exceed the manufacturer's recommended working pressure.

(4) Not exceed the test pressure used in the latest test under paragraph (e)(3) of this section.

(e) A cargo hose assembly must be inspected and tested by placing it in a straight, horizontal position so that its entire external surface is accessible. It must be ascertained that the hose assembly—

(1) Has no loose covers, kinks, bulges, soft spots, and no gouges, cuts, or slashes that penetrate any hose reinforcement;

(2) Has no external and, to the extent internal inspection is possible with both ends of the hose open, no internal deterioration; and

(3) Does not burst, bulge, leak, or abnormally distort under static liquid pressure at least 1½ times the recommended working pressure.

§ 150.485 Signals during cargo transfer.

The master shall ensure that the incinerator vessel displays a red flag in the day and a red light at night when transferring cargo while fast to a dock.

§ 150.490 Warning signs during cargo transfer.

(a) When transferring cargo to the vessel, the master shall ensure that the incinerator vessel displays a warning sign at the gangway facing the shore so that it may be seen from the shore and another warning sign facing outboard toward the water so that it may be seen from the water.

(b) Each warning sign must have the following legends.

(See figure 150.490):

(1) Warning.

(2) Dangerous Cargo.

(3) No Visitors.

(4) No Smoking.

(5) No Open Lights.

(c) Each letter must be block style, black on a white background.

(d) Each letter must—

(1) Be 7.5 cm (approx. 3 in.) high;

(2) Be 5 cm (approx. 2 in.) wide except for "M" and "W" which must be 7.5 cm (Approx. 3. in.) wide and the letter "I" which may be 1.3 cm (approx. ½ in.) wide; and

(3) Have 1.3 cm (approx. ½ in.) stroke width.

(e) The spacing must be—

(1) 1.3 cm (approx. ½ in.) between letters of the same word;

(2) 5 cm (approx. 2 in.) between words;

(3) 5 cm (approx. 2 in.) between lines; and

(4) 5 cm (approx. 2 in.) at the borders of the sign.

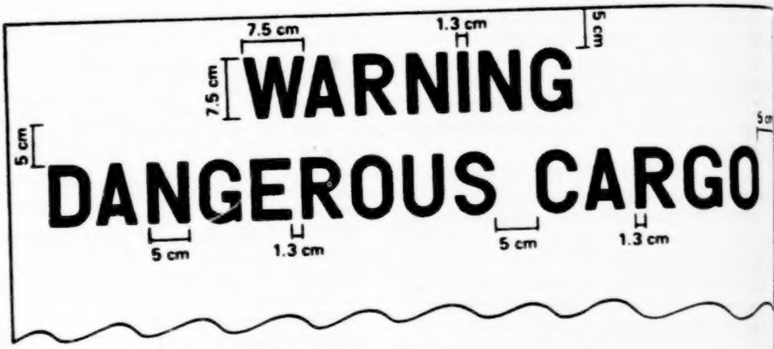

Figure 1 - Minimum Dimensions for Warning Sign

FIGURE 150.490—MINIMUM DIMENSIONS FOR WARNING SIGN

§ 150.495 Person in charge of cargo transfer.

(a) The master shall ensure that cargo transfer operations are supervised by a person designated as a person in charge of cargo transfer under 33 CFR 155.710.

(b) No person may make connections for cargo transfer or transfer cargo unless he has authorization from the person in charge of cargo transfer.

§ 150.500 Cargo transfer conference.

(a) Before making connections for cargo transfer, the person in charge of cargo transfer shall confer with the person supervising the cargo transfer at the facility.

(b) The person in charge of cargo transfer shall discuss the important aspects of the transfer operation, such as the following, with the supervisor at the facility:

(1) The cargo to be transferred.

(2) The cargo loading rates marked on the cargo piping plan or the maximum safe transfer rates.

(3) The critical or hazardous stages of the transfer operation.

(4) The emergency procedures in case of a spill.

(5) A procedure for shutdown of shore pumps, shore valves, and vessel's valves that prevents piping syst pressures from exceeding those i which the piping system is designed

§ 150.505 Loading information.

Each incinerator vessel must hav manual containing information th enables the master to load and bal the vessel while keeping structu stresses within design limits.

§ 150.507 Discharges.

(a) The master of an inciner vessel shall ensure that there are operational discharges of cargo cluding without limitation cargo re dues from tank washings, pumpro bilges, ballast tanks, and slop tan from the vessel to the sea.

(b) Cargo and cargo residues on incinerator vessel may be disposed only by incineration at sea or by charge to an adequate reception fa ty as defined in 33 CFR 153.2.

§ 150.510 Cargo transfer piping.

The person in charge of cargo tra fer shall ensure that—

(a) Cargo is transferred to or fro cargo tank only through the ves cargo piping system;

(b) Vapor not returned to sh through the incinerator vessel's va return system is discharged at height required for the vessel's ca vent riser in § 150.295 of this chap

(c) All cargo vapor is returned to shore through the valved connection on the venting system if:

(1) The transfer terminal has vapor return equipment; and

(2) The vapor return equipment is adequate to handle the vapor expected from the tank.

§ 150.515 Connecting a cargo hose.

The person in charge of cargo transfer may not authorize the connection of a hose to a cargo containment system unless—

(a) That person ensures that the cargo will not weaken or damage the hose;

(b) The hose is marked as meeting the standards of § 150.480;

(c) The date of the hose's last pressure test is within one year of the date on which the hose is used to transfer cargo;

(d) The recommended working pressure marked on a hose used for discharge meets or exceeds the working pressure marked on the cargo piping at the hose connection; and

(e) The cargo's temperature is within the manufacturer's recommended maximum and minimum hose temperatures.

§ 150.520 Preparation for cargo transfer.

The person in charge of cargo transfer may not begin or continue cargo transfer unless the following conditions are met:

(a) No fires or open flames are on deck or in compartments near the hose connections.

(b) Any electrical bonding of the vessel incinerator vessel to the transfer facility is made before the cargo transfer piping is joined.

(c) The transfer connections have enough slack to allow for vessel movement.

(d) The transfer connections are supported by tackles.

(e) The cargo high level alarms, tank overflow alarms and overflow control systems are functioning correctly when the cargo is loaded.

(f) Joints and couplings are gasketed and mated tightly.

(g) Flanges are bolted tightly.

(h) No repair work is underway in areas where cargo vapors may collect.

(i) Cargo valves are properly set.

(j) Venting system bypass valves are set for cargo transfer and are operating properly.

(k) All scuppers are plugged.

(l) Smoking is limited to safe places.

(m) Fire fighting and safety equipment is ready.

(n) Discharge containment as required by 33 CFR 155.310 is in place and periodically drained to a cargo tank. Spray shields on the flanges of the manifold connections must also be provided.

(o) The person in charge of cargo transfer is in effective communication with the transfer terminal.

(p) The person in charge of the transfer terminal has acknowledged that the transfer terminal is ready to transfer.

(q) Pressures within the cargo transfer and containment systems do not exceed the pressure ranges for which the transfer hose and containment systems are designed.

(r) No vessels that would hazard cargo transfer are alongside the incinerator vessel.

§ 150.525 Transfer of ship stores.

The person in charge of cargo transfer may neither begin nor continue the transfer of a cargo while ship's stores are transferred unless transfer of ship's stores does not hazard transfer of the cargo.

§ 150.530 Supervision of cargo transfer.

The person in charge of cargo transfer shall—

(a) Supervise the operation of cargo system valves;

(b) Monitor the cargo loading rate to ensure it does not exceed that stated on the cargo piping plan; and

(c) Monitor the cargo level in the tanks to make sure they do not overflow.

(d) Ensure that the amount of cargo in a tank does not exceed the tank's capacity at any ambient temperature between −18°C (approx. 0°F) and 46°C (approx. 115°F).

§ 150.535 Isolation of automatic closing valves.

The person in charge of cargo transfer may not isolate automatic closing valves described in § 150.300 of this chapter from a cargo containment system.

§ 150.540 Terminal procedures.

Upon completion of the transfer operation, the person in charge of cargo transfer shall ensure that—

(a) The cargo transfer connections are closed off;

(b) The transfer lines and hoses are drained of cargo, either into the tank or back to the transfer terminal;

(c) Any electrical bonding between the vessel and the shore facility is broken only after the cargo hose is connected; and

(d) Each vent system is returned its nonloading configuration.

§ 150.545 Inspection of personnel em gency and safety equipment.

The master shall ensure that personnel emergency and safety equ ment required by § 150.395 of chapter is inspected every 30 days found to be in good condition and erating properly.

§ 150.550 Reporting discharges of carg

The master shall ensure that overboard discharges of cargo are ported in the manner prescribed oil and hazardous substances in CFR 151.45 (c), (d), (g), and (h).

FIGURE 1—COMPATIBILITY CHART

[X indicates incompatible groups]

[See Appendix I for exceptions]

CARGO COMPATIBILITY REACTIVE GROUPS CARGO GROUPS	1 NON OXIDIZING MINERAL ACIDS	2 SULFURIC ACID	3 NITRIC ACID	4 ORGANIC ACIDS	5 CAUSTICS	6 AMMONIA	7 ALIPHATIC AMINES	8 ALKANOLAMINES	9 AROMATIC AMINES	10 AMIDES	11 ORGANIC ANHYDRIDES	12 ISOCYANATES	13 VINYL ACETATE	14 ACRYLATES	15 SUBSTITUTED ALLYLS	16 ALKYLENE OXIDES	17 EPICHLOROHYDRIN	18 KETONES	19 ALDEHYDES	20 ALCOHOLS GLYCOLS	21 PHENOLS CRESOLS	22 CAPROLACTAM SOLUTION	
1. NON-OXIDIZING MINERAL ACIDS		x			x	x	x	x	x	x	x	x	x			x	x						1
2. SULFURIC ACID	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2
3. NITRIC ACID		x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		3
4. ORGANIC ACIDS		x			x	x	x	x				x				x	x						4
5. CAUSTICS	x	x	x	x							x	x				x	x		x	x	x	x	5
6. AMMONIA	x	x	x	x						x	x	x	x			x	x		x				6
7. ALIPHATIC AMINES	x	x	x	x							x	x	x	x	x	x	x	x	x	x	x	x	7
8. ALKANOLAMINES	x	x	x	x							x	x	x	x	x	x	x		x				8
9. AROMATIC AMINES	x	x	x								x	x							x				9
10. AMIDES	x	x	x			x						x									x		10
11. ORGANIC ANHYDRIDES	x	x	x		x	x	x	x	x														11
12. ISOCYANATES	x	x	x	x	x	x	x	x	x	x										x		x	12
13. VINYL ACETATE	x	x	x			x	x	x															13
14. ACRYLATES		x	x				x	x															14
15. SUBSTITUTED ALLYLS		x	x				x	x															15
16. ALKYLENE OXIDES	x	x	x	x	x	x	x	x															16
17. EPICHLOROHYDRIN	x	x	x	x	x	x	x	x															17
18. KETONES		x	x				x																18
19. ALDEHYDES		x	x		x	x	x	x	x														19
20. ALCOHOLS, GLYCOLS		x	x		x		x					x											20
21. PHENOLS, CRESOLS		x	x		x		x			x													21
22. CAPROLACTAM SOLUTION		x			x		x					x											22
30. OLEFINS		x	x																				30
31. PARAFFINS																							31
32. AROMATIC HYDROCARBONS			x																				32
33. MISCELLANEOUS HYDROCARBON MIXTURES			x																				33
34. ESTERS		x	x																				34
35. VINYL HALIDES			x																			x	35
36. HALOGENATED HYDROCARBONS																							36
37. NITRILES		x																					37
38. CARBON DISULFIDE							x	x															38
39. SULFOLANE																							39
40. GLYCOL ETHERS		x										x											40
41. ETHERS		x	x																				41
42. NITROCOMPOUNDS					x	x	x	x	x														42
43. MISCELLANEOUS WATER SOLUTIONS		x										x											43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	

[CGD 75-59, 45 FR 70263, Oct. 23, 1980, as amended by CGD 83-047, 50 FR 33039, Aug. 16, 1985; CGD 86-100, 52 FR 21037, June 4, 1987]

TABLE I—ALPHABETICAL LIST OF CARGOES

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Acetaldehyde	19	AAD	
Acetic acid	[2]4	AAC	
Acetic anhydride	11	ACA	
Acetone	[2] 18	ACT	
Acetone cyanohydrin	[1] [2]0	ACY	
Acetonitrile	37	ATN	
Acetophenone	18	ACP	
Acetyl tributyl citrate	34		
Acrolein	[2]19	ARL	
Acrylamide solution	10	AAM	
Acrylic acid	[2]4	ACR	
Acrylonitrile	[2]15	ACN	
Acrylonitrile-Styrene copolymer dispersion in Polyether polyol	20	ALE	
Adiponitrile	37	ADN	
Alcohols (C13 and above)	20	ALY	TDN/TTN/PDC

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Alcoholic beverages	20		
Alcohol polyethoxylates	20		APK/APL
Alcohol polyethoxylates, secondary	20		AEA/AEB
Alkyl acrylate-Vinyl pyridine copolymer in Toluene	32	AAP	
Alkyl(C9 - C17) benzenes	32	AKB	DBZ/UDB/DDB/TRB/TDB
Alkylbenzenesulfonic acid	L [2] 0	ABS	
Alkylbenzenesulfonic acid, sodium salt solutions	33	ABT	
Alkyl phthalates	34		
Allyl alcohol	[2] 15	ALA	
Allyl chloride	15	ALC	
Aluminium chloride, Hydrochloric acid solution	0	AHS	
Aluminum sulfate solution	[2] 43	ASX	ALM
2-(2-Aminoethoxy)ethanol	8	AEX	
Aminoethyldiethanolamine, Aminoethylethanolamine solution	8		
Aminoethylethanolamine	8	AEE	
N-Aminoethylpiperazine	7	AEP	
2-Amino-2-hydroxymethyl-1,3-propanediol solution	43	AHL	
2-Amino-2-methyl-1-propanol	8	APR	
Ammonia, anhydrous	6	AMA	
Ammonium bisulfite solution	[2] 43	ABX	ASU
Ammonium hydrogen phosphate solution	0		
Ammonium hydroxide (28% or less Ammonia)	6	AMH	
Ammonium nitrate solution	[1] 0	ANR	AMN
Ammonium nitrate, Urea solution (containing Ammonia)	6	UAS	
Ammonium nitrate, Urea solution (not containing Ammonia)	43	ANU	
Ammonium polyphosphate solution	43		ANS/APP
Ammonium sulfate solution	43	AME	AMS
Ammonium sulfide solution	5	ASS	ASF
Ammonium thiocyanate, Ammonium thiosulfate solution	0	ACS	
Ammonium thiosulfate solution	43	ATV	ATF
Amyl acetate	34	AEC	IAT/AML/AAS/
Amyl alcohol	20	AAI	IAA/AAN/ASE/
Amylene	30	AMZ	PTX/PTE
Amyl methyl ketone	18	AMK	
Amyl tallate	34		
Aniline	9	ANL	
Anthracene oil (Coal tar fraction), *see* Coal tar	33	AHO	COR
Asphalt	33	ASP	ACU
Asphalt blending stocks, roofers flux	33	ARF	
Asphalt blending stocks, straight run residue	33	ASR	
Aviation alkylates	33	AVA	GAV
Behenyl alcohol	20		
Benzene	32	BNZ	
Benzene hydrocarbon mixtures (having 10% Benzene or more)	32	BHB	
Benzenesulfonyl chloride	L [2] 0	BSC	
Benzene, Toluene, Xylene mixtures	32	BTX	
Benzene tricarboxylic acid, trioctyl ester	34		
Benzylacetate	34	BZE	
Benzyl alcohol	21	BAL	
Benzyl chloride	36	BCL	
Brake fluid base mixtures	20	BFX	
Butadiene	30	BDI	
Butadiene, Butylene mixtures (cont. Acetylenes)	30	BBM	
Butane	31	BMX	IBT/BUT
Butene	30		IBL/BTN
Butene oligomer	30	BOL	
Butyl acetate	34	BAX	IBA/BCN/BTA/
Butyl acrylate	14	BAR	BAI/BTC
Butyl alcohol	[2] 20		IAL/BAN/BAS/
Butylamine	7	BTY	IAM/BAM/BTL/
Butylbenzene	32	BBE	
Butyl benzyl phthalate	34	BPH	
n-Butyl butyrate	34	BUB	
Butylene	30	BTN	IBL
Butylene glycol	[2] 20	BUG	
Butylene oxide	16	BTO	
Butyl ether	41	BTE	
Butyl formate	34		BFI/BFN

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
iso-Butyl isobutyrate	34	BIB	
Butyl heptyl ketone	18	BHK	
Butyl methacrylate	14	BMH	BMI/BMN
Butyl methacrylate, Decyl methacrylate, Cetyl-Eicosyl methacrylate mixture	14	DER	
Butyl phenol, Formaldehyde resin in Xylene	32		
Butyl toluene	32	BUE	
Butyraldehyde	19	BAE	BAD/BTR/BFA
Butyric acid	4	BRA	IBR
gamma-Butyrolactone	[2]0	BLA	
Calcium bromide solution	43		CBM
Calcium bromide, Zinc bromide solution *see* Drilling brine (containing Zinc salts)	43		DZB
Calcium chloride solution	43	CCS	CLC
Calcium hypochlorite solutions	5		CHZ/CHU/CHY
Calcium naphthenate in Mineral oil	34	CNM	
Calcium nitrate, Magnesium nitrate, Potassium chloride solution	34		
Calcium sulfonate, Calcium carbonate, Hydrocarbon solvent mixture	33		
Camphor oil	18	CPO	
Caprolactam solution	22	CLS	
Carbolic oil	21	CBO	
Carbon black base	33		
Carbon disulfide	38	CBB	
Carbon tetrachloride	36	CBT	
Cashew nut shell oil (untreated)	4	OCN	
Caustic potash solution	[2]5	CPS	
Caustic soda solution	[2]5	CSS	
Cetyl-Eicosyl methacrylate mixture	14	CEM	
Chlorinated paraffins (C10 - C13)	36	CLH	
Chlorinated paraffins (C14 - C17)	36		
Chlorine	[1]0	CLX	
Chloroacetic acid solution	4	CHM	CHL/MCA
Chlorobenzene	36	CRB	
Chlorodifluoromethane	36	MCF	
Chloroform	36	CRF	
Chlorohydrins	17	CHD	
4-Chloro-2-methylphenoxyacetic acid, Dimethylamine salt solution	9	CDM	
Chloronitrobenzene *see* o-Nitrochlorobenzene			CNO
Chloropropionic acid	4	CPM	CLA/CLP
Chlorosulfonic acid	[1]0	CSA	
Chlorotoluene	36	CHI	CTM/CTO/CRN
Choline chloride solutions	20	CCO	
Coal tar	33	COR	OCT
Coal tar pitch	33	CTP	
Coconut oil, fatty acid	34	CFA	
Corn syrup	43	CSY	
Cottonseed oil, fatty acid	34	CFY	
Creosote	[2]21	CCT	CCW/CWD
Cresols	21	CRS	CRL/CSL/CSO
Cresylate spent caustic	5	CSC	
Cresylic acid	21	CRY	
Cresylic acid, sodium salt solution	5		CSC
Crotonaldehyde	[2]19	CTA	
Cumene	32	CUM	
Cycloaliphatic resins	31		
1,5,9-Cyclododecatriene	30	CYT	
Cycloheptane	31	CYE	
Cyclohexane	31	CHX	
Cyclohexane oxidation product acid water	4		
Cyclohexanol	20	CHN	
Cyclohexanone	18	CCH	
Cyclohexanone, Cyclohexanol mixtures	[2]18	CYX	
Cyclohexyl acetate	34	CYC	
Cyclohexylamine	7	CHA	
1,3-Cyclopentadiene dimer	30	CPD	
Cyclopentadiene polymers	30		CPD
Cyclopentadiene, Styrene, Benzene mixtures	30	CSB	
Cyclopentane	31	CYP	
Cyclopentene	30	CPE	
Cymene	32	CMP	
Decahydronaphthalene	33	DHN	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRI codes
Decaldehyde	19		IDA/DAL
Decane	31	DDC	PFN
Decanoic acid	4	DCO	
Decene	30	DCE	
Decyl acrylate	14	DAT	IAI/DAR
Decyl alcohol	[1]20	DAX	ISA/DAN
Decylbenzene	32	DBZ	AKB
Dextrose solution	43	DTS	
Diacetone alcohol	[1]20	DAA	
Dialkyl(C10 - C14) benzenes	32	DAB	
Dialkyl(C7 - C13) phthalates	34	DAH	DHP/DIE/DOP/D DTP/DUP
Diammonium salt of Zinc EDTA solution	43	DSZ	
Dibutylamine	7	DBA	
Dibutyl phthalate	34	DPA	
Dichlorobenzene	36	DBX	DBM/DBO/DBP
Dichlorodifluoromethane	36	DCF	
1,1-Dichloroethane	36	DCH	
2,2'-Dichloroethyl ether	41	DEE	
2,2'-Dichloroisopropyl ether	36	DCI	
Dichloromethane	36	DCM	
2,4-Dichlorophenol	21	DCP	
2,4-Dichlorophenoxyacetic acid, Diethanolamine salt solution	43	DDE	
2,4-Dichlorophenoxyacetic acid, Dimethylamine salt solution	[1]0	DAD	DDA/DSX
2,4-Dichlorophenoxyacetic acid, Triisopropanolamine salt solution	[1]43	DTI	
Dichloropropane	36	DPX	DPB/DPP/DPC/D
1,3-Dichloropropene	15	DPS	DPU/DPF
Dichloropropene, Dichloropropane mixtures	15	DMX	
2,2-Dichloropropionic acid	4	DCN	
Dicyclopentadiene	30	DPT	
Didecyl dimethyl ammonium chloride, Ethanol mixture solution	43	DDX	
Diethanolamine	8	DEA	
Diethanolamine salt of 2,4-Dichlorophenoxyacetic acid solution	43	DDE	
Diethylamine	7	DEN	
Diethylaminoethanol	8		DAE
2,6-Diethylaniline	9	DMN	
Diethylbenzene	32	DEB	
Diethylene glycol	40	DEG	
Diethylene glycol butyl ether	40	DME	
Diethylene glycol butyl ether acetate	34	DEM	
Diethylene glycol dibutyl ether	40	DIG	
Diethylene glycol ethyl ether	40	DGE	
Diethylene glycol ethyl ether acetate	34	DGA	
Diethylene glycol methyl ether	40	DGM	
Diethylene glycol methyl ether acetate	34	DGR	
Diethylene glycol phenyl ether	40	DGP	
Diethylene glycol phthalate	34	DGL	
Diethylenetriamine	[1]7	DET	
Diethylethanolamine	8	DAE	
Diethyl ether	41		EET
Di-(2-ethylhexyl)adipate	34	DEH	
Di-(2-ethylhexyl)phosphoric acid	1	DEP	
Di-(2-ethylhexyl)phthalate	34	DIE	DIO/DOP/DAH
Diethyl phthalate	34	DPH	
Diethyl sulfate	34	DSU	
Diglycidyl ether of Bisphenol A	41	BDE	BPA
Diglycidyl ether of Bisphenol F	41	DGF	
Diheptyl phthalate	34	DHP	
Di-n-hexyl adipate	34	DHA	
Diisobutylamine	7	DBU	
Diisobutyl carbinol	20	DBC	
Diisobutylene	30	DBL	
Diisobutyl ketone	18	DIK	
Diisobutyl phthalate	34	DIT	
Diisodecyl phthalate	34	DID	
Diisononyl adipate	34	DNY	
Diisononyl phthalate	34	DIN	
Diisooctyl phthalate	34	DIO	
Diisopropanolamine	8	DIP	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Diisopropylamine	7	DIA	
Diisopropylbenzene	32	DIX	
Diisopropyl naphthalene	32	DII	
N,N-Dimethylacetamide	10	DAC	
N,N-Dimethylacetamide solution	10	DLS	
Dimethyl adipate	34	DLA	
Dimethylamine	7	DMA	
Dimethylamine solution	7		DMG/DMY/DMC
Dimethylamine salt of 4-Chloro-2-methylphenoxyacetic acid solution	9	CDM	
Dimethylamine salt of 2,4-Dichlorophenoxyacetic acid solution	[1,2]0	DAD	DDA/DSX
2,6-Dimethylaniline	9	DMM	
Dimethylcyclicsiloxane hydrolyzate	34		
N,N-Dimethylcyclohexylamine	7	DXN	
Dimethylethanolamine	8	DMB	
Dimethylformamide	10	DMF	
Dimethyl furan	41		
Dimethyl glutarate	34	DGT	
Dimethyl hydrogen phosphite	[2]34	DPI	
Dimethyl naphthalene sulfonic acid, sodium salt solution	[2]34	DNS	
Dimethyloctanoic acid	4	DMO	
Dimethyl phthalate	34	DTL	
Dimethylpolysiloxane	34	DMP	
2,2-Dimethylpropane-1,3-diol	20	DDI	
Dimethyl succinate	34	DSE	
Dinitrotoluene	42	DNM	DTT/DNL/DNU
Dinonyl phthalate	34	DIF	DAH
Dioctyl phthalate	34	DOP	DAH
1,4-Dioxane	41	DOX	
Dipentene	30	DPN	
Diphenyl	32	DIL	
Diphenyl, Diphenyl ether mixture	33	DDO	DTH
Diphenyl ether	41	DPE	
Diphenyl ether, Diphenyl phenyl ether mixture	41	DOB	
Diphenylmethane diisocyanate	12	DPM	
Diphenylol propane-Epichlorohydrin resins	[1]0	DPR	
Di-n-Propylamine	7	DNA	
Dipropylene glycol	40	DPG	
Dipropylene glycol dibenzoate	34	DGY	
Dipropylene glycol methyl ether	40	DPY	
Distillates, flashed feed stocks	33	DFF	
Distillates, straight run	33	DSR	
Ditridecyl phthalate	34	DTP	DAH
Diundecyl phthalate	34	DUP	DAH
Dodecane	31	DOC	PFN
Dodecanol	20	DDN	LAL
Dodecene	30	DOZ	DDC/DOD
2-Dodecenylsuccinic acid, dipotassium salt solution	34		
Dodecylamine, Tetradecylamine mixture	[2]7	DTA	
Dodecyl alcohol	20		DDN/LAL
Dodecylbenzene	32	DDB	AKB
Dodecylbenzenesulfonic acid	[2]0	DSA	
Dodecyl diphenyl ether disulfonate solution	43	DOS	
Dodecyl methacrylate	14	DDM	
Dodecyl-Pentadecyl methacrylate mixtures	14	DDP	
Dodecyl phenol	21	DOL	
Drilling brine (containing Calcium, Potassium or Sodium salts)	43		DRB
Drilling brine (containing Zinc salts)	43	DZB	
Drilling mud (low toxicity) (*if flammable or combustible*)	33		DRM
Drilling mud (low toxicity) (*if non-flammable or non-combustible*)	43		DRM
Epichlorohydrin	17	EPC	
Epoxy resin	18		
Ethane	31	ETH	
Ethanolamine	8	MEA	
2-Ethoxyethanol	20	EEO	
2-Ethoxyethyl acetate	34	EEA	
Ethoxylated alcohols, C11-C15	20		EOD/ENP/EOP/ EOT/ETD
Ethoxy triglycol	40	ETG	
Ethyl acetate	34	ETA	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related C codes
Ethyl acetoacetate	34	EAA	
Ethyl acrylate	14	EAC	
Ethyl alcohol	[2]20	EAL	
Ethylamine	[2]7	EAM	
Ethylamine solution	7	EAN	
Ethyl amyl ketone	18	EAK	ELK
Ethylbenzene	32	ETB	
Ethyl butanol	20	EBT	
N-Ethyl-n-butylamine	7	EBA	
Ethyl butyrate	34	EBR	
Ethyl chloride	36	ECL	
Ethyl chlorothioformate	[1]0	ECT	
N-Ethylcyclohexylamine	7	ECC	
Ethylene	30	ETL	
Ethylene chlorohydrin	20	ECH	
Ethylene cyanohydrin	20	ETC	
Ethylenediamine	[2]7	EDA	EMX
Ethylenediaminetetracetic acid, tetrasodium salt solution	43	EDS	
Ethylene dibromide	36	EDB	
Ethylene dichloride	[2]36	EDC	
Ethylene glycol	[2]20	EGL	
Ethylene glycol acetate	34	EGO	
Ethylene glycol butyl ether	40	EGM	
Ethylene glycol tert-butyl ether	40		
Ethylene glycol butyl ether acetate	34	EMA	
Ethylene glycol diacetate	34	EGY	
Ethylene glycol dibutyl ether	40	EGB	
Ethylene glycol ethyl ether	40	EGE	
Ethylene glycol ethyl ether acetate	34	EGA	
Ethylene glycol isopropyl ether	40	EGI	
Ethylene glycol methyl ether	40	EME	
Ethylene glycol methyl ether acetate	34	EGT	
Ethylene glycol phenyl ether	40	EPE	
Ethylene glycol phenyl ether, Diethylene glycol phenyl ether mixture	40	EDX	
Ethylene glycol propyl ether	40	EGP	
Ethylene oxide	[1]0	EOX	
Ethylene oxide, Propylene oxide mixture	16	EPM	
Ethylene-Vinyl acetate copolymer emulsion	43		
Ethyl ether	41	EET	
Ethyl-3-ethoxypropionate	34	EEP	
2-Ethylhexaldehyde	19	EHA	
2-Ethylhexanoic acid	4	EHO	
2-Ethylhexanol	20	EHX	
2-Ethylhexyl acrylate	14	EAI	
2-Ethylhexylamine	7	EHM	
Ethyl hexyl phthalate	34	EHE	
Ethyl hexyl tallate	34	EHT	
Ethylidene norbornene	[2]30	ENB	
Ethyl methacrylate	14	ETM	
2-Ethyl-6-methyl-N-(1'-methyl-2-methoxyethyl)aniline	9	EEM	
o-Ethyl phenol	21	EPL	
Ethyl propionate	34	EPR	
2-Ethyl-3-propylacrolein	[2]19	EPA	
Ethyl toluene	32	ETE	
Fatty acids (saturated, C13 and above)	34		
Fatty acid amides	33		
Ferric chloride solution	1	FCS	FCL
Ferric hydroxyethylethylenediaminetriacetic acid, trisodium salt solution	[2]43	FHX	STA
Ferric nitrate, Nitric acid solution	3	FNN	
Fish solubles (*water based fish meal extracts*)	43	FSO	
Formaldehyde, Methanol mixtures	[2]19	MTM	
Formaldehyde solution	[2]19	FMS	
Formamide	10	FAM	
Formic acid	[2]4	FMA	
Fructose solution	43		
Fumaric adduct of Rosin, water dispersion	43	FAR	
Furfural	19	FFA	
Furfuryl alcohol	[2]20	FAL	
Gas oil, cracked	33	GOC	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Gasoline blending stock, **alkylates**	33	GAK	
Gasoline blending stock, **reformates**	33	GRF	
Gasolines:			
Automotive (*not over 4.23 grams lead per gal.*)	33	GAT	
Aviation (*not over 4.86 grams lead per gal*)	33	GAV	AVA
Casinghead (*natural*)	33	GCS	
Polymer	33	GPL	
Straight run	33	GSR	
Glutaraldehyde solution	19	GTA	
Glycerine	[2]20	GCR	
Glycerol polyalkoxylate	34		
Glyceryl triacetute	34		
Gylcidyl ester of tridscylacetic acid	34	GLT	
Glycidyl ester of Versatic acid	34		GLT
Glycol diacetate	34		
Glycols, Resins, and Solvents mixture	33		
Glyoxal solutions	19	GOS	
Heptane	31	HMX	HPI/HPT
n-Heptanoic acid	4	HEP	
Heptanol	20	HTX	HTN
Heptene	30	HPX	HTE
Heptyl acetate	34	HPE	
Herbicide (C15-H22-NO2-Cl)	33		MCO
Hexamethylenediamine solution	7	HMC	HMD
Hexamethylenetetramine	7	HMT	
Hexamethylenetetramine solutions	7	HTS	
Hexamethylenimine	7	HMI	
Hexane	[2]31	HXS	IHA/HXA
Hexanoic acid	4	HXO	
Hexanol	20	HXN	
Hexene	30	HEX	HXE/HXT
Hexyl acetate	34	HAE	HSA
Hexylene glycol	20	HXG	
Hydrochloric acid	1	HCL	
Hydrochloric acid, spent	1	HCS	
Hydrofluorosilicic acid	1	HFS	
Hydrogen peroxide solutions	[1]0		HPN/HPS/HPO
2-Hydroxyethyl acrylate	L [2]0	HAI	
N-(Hydroxyethyl)ethylenediaminetriacetic acid, trisodium salt solution	43	HET	
2-Hydroxy-4-(methylthio)butanoic acid	4	HBA	
Isophorone	[2]18	IPH	
Isophorone diamine	7	IPI	
Isophorone diisocyanate	12	IPD	
Isoprene	30	IPR	
Isopropylbenzene	32	CUM	
Jet fuels:			
JP-1	33	JPO	
JP-3	33	JPT	
JP-4	33	JPF	
JP-5	33	JPV	
JP-8	33	JPE	
Kaolin clay slurry	43		
Kerosene	33	KRS	
Ketone residue	18		
Kraft black liquor	5		KPL
Kraft pulping liquors (*Black, Green, or White*)	5	KPL	
Lactonitrile solution	37	LNI	
Latex, liquid synthetic	43	LLS	LTX
Lauric acid	34	LRA	
Lignin liquor	43		
Magnesium chloride solution	L [2]0		
Magnesium nonyl phenol sulfide	33		
Magnesium sulfonate	34	MSE	MAS
Maleic anhydride	11	MLA	
Maleic anhydride copolymer	33		
Mercaptobenzothiazol, sodium salt solution	5		SMB
Mesityl oxide	[2]18	MSO	
Metam sodium solution	7	MSS	SMD
Methacrylic acid	4	MAD	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHR codes
Methacrylonitrile	15	MET	
Methane	31	MTH	
3-Methoxy-1-butanol	20		
3-Methoxybutyl acetate	34	MOA	
1-Methoxy-2-propyl acetate	34	MPO	
Methoxy triglycol	40	MTG	
Methyl acetate	34	MTT	
Methyl acetoacetate	34	MAE	
Methyl acetylene, Propadiene mixture	30	MAP	
Methyl acrylate	14	MAM	
Methyl alcohol	[2]20	MAL	
Methylamine	7	MTA	
Methylamine solutions	7	MSZ	
Methyl amyl acetate	34	MAC	
Methyl amyl alcohol	20	MAA	
Methyl amyl ketone	18	MAK	
Methyl bromide	36	MTB	
Methyl butenol	20	MBL	
Methyl butyl ketone	18	MBK	
Methyl tert-butyl ether	[2]41	MBE	
Methylbutynol	20	MBY	
3-Methyl butyraldehyde	19		
Methyl butyrate	34	MBU	
Methyl chloride	36	MTC	
Methylcyclohexane	31	MCY	
Methylcyclopentadiene dimer	30	MCK	
Methyl diethanolamine	8	MDE	MAB
4,4'-Methylene dianiline (43% or less), Polymethylene polyphenylamine, o-Dichlorobenzene mixtures.	9	MDB	
2-Methyl-6-ethylaniline	9	MEN	
Methyl ethyl ketone	[2]18	MEK	
2-Methyl-5-ethylpyridine	9	MEP	
Methyl formal	41	MTF	
Methyl formate	34	MFM	
Methyl heptyl ketone	18	MHK	
2-Methyl-2-hydroxy-3-butyne	20	MHB	
Methyl isoamyl ketone	18		MAK
Methyl isobutyl carbinol	20	MIC	
Methyl isobutyl ketone	[2]18	MIK	
Methyl methacrylate	14	MMM	
3-Methyl-3-methoxybutanol	20		
3-Methyl-3-methoxybutyl acetate	34		
Methyl naphthalene	32	MNA	
Methylolureas	19	MUS	
2-Methyl pentane	31		IHA
2-Methyl-1-pentene	30	MPN	
4-Methyl-1-pentene	30	MTN	
Methylpyridine	9		MPR/MPE/MP
N-Methyl-2-pyrrolidone	9	MPY	
Methyl salicylate	34	MES	
alpha-Methylstyrene	30	MSR	
Metolachlor	34	MCO	
Mineral spirits	33	MNS	
Molasses	20		
Molasses residue	0		
Monochlorodifluoromethane	36	MCF	
Morpholine	[2]7	MPL	
Motor fuel antiknock compounds containing lead alkyls	[1]0	MFA	
Myrcene	30	MRE	
Naphtha:			
Coal tar solvent	33	NCT	
Cracking fraction	[2]33		
Petroleum	33	PTN	
Solvent	33	NSV	
Stoddard solvent	33	NSS	
Varnish Makers' and Painters'	33	NVM	
Naphthalene	32	NTM	
Naphthalene sulfonic acid-formaldehyde copolymer, sodium salt solution	0	NFS	
Naphthalene sulfonic acid, sodium salt solution	34	NSA	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Naphthenic acid	4	NTI	
Naphthenic acid, sodium salt solution	43	NTS	
Neodecanoic acid	4	NEA	
Nitrating acid	[1]0	NIA	
Nitric acid (70% or less)	3	NCD	
Nitric acid (greater than 70%)	[1]0		NAC
Nitrobenzene	42	NTB	
o-Nitrochlorobenzene	42	CNO	CNP
Nitroethane	42	NTE	
o-Nitrophenol	[2]0	NTP	NIP/NPH
Nitropropane	42	NPM	NPN/NPP
Nitropropane, Nitroethane mixture	42	NNM	
Nitrotoluene	42	NIT	NIE/NTT/NTR
Nonane	31	NAX	NAN
Nonanoic acid	4	NNA	NAI/NIN
Nonene	30	NON	NNE
Nonyl alcohol	[2]20	NNS	NNI/NNN
Nonyl methacrylate	14	NMA	
Nonyl phenol	21	NNP	
Nonyl phenol (ethoxylated)	40		NPE
Nonyl phenol poly(4-12)ethoxylates	40	NPE	
Nonyl phenol sulfide solution	33		NPS
Noxious Liquid Substance, n.o.s. (NLS's)	0		
1-Octadecene	30		
Octadecenoamide	10	ODD	
Octane	31	OAX	IOO/OAN
Octanoic acid	4	OAY	OAA
Octene	30	OTX	OTE
Octyl alcohol (Octanol)	[2]20	OCX	IOA/OTA
Octyl aldehyde	19	OAL	IOC/OLX
Octyl decyl adipate	34	ODA	
Octyl epoxytallate	34	OET	
Octyl nitrate	[2]34	ONE	
Octyl phenol	21		
Oil, edible:			
Babassu	34	OBB	
Castor	34	OCA	
Coconut	[2]34	OCC	
Corn	34	OCO	
Cottonseed	34	OCS	
Fish	[2]34	OFS	
Lard	34	OLD	
Olive	34	OOL	
Palm	[2]34	OPM	
Palm kernel	34	OPO	
Peanut	34	OPN	
Rapeseed	34	ORP	
Rice bran	34	ORB	
Safflower	34	OSF	
Soya bean	34	OSB	
Sunflower seed	34	OSN	
Tucum	34	OTC	
Vegetable	34	OVG	
Oil, fuel:			
No. 1	33	OON	
No. 1-D	33	OOD	
No. 2	33	OTW	
No. 2-D	33	OTD	
No. 4	33	OFR	
No. 5	33	OFV	
No. 6	33	OSX	
Oil, misc:			
Absorption	33	OAS	
Aliphatic	33		
Aromatic	33		
Clarified	33	OCF	
Coal	33		
Coconut oil, fatty acid methyl ester	34	OCM	
Cotton seed oil, fatty acid	34	CFY	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHR codes
Crude	33	OIL	
Diesel	33	ODS	
Heartcut distillate	33		
Linseed	33	OLS	
Lubricating	33	OLB	
Mineral	33	OMN	
Mineral seal	33	OMS	
Motor	33	OMT	
Neatsfoot	33	ONF	
Oiticica	34	OOI	
Palm oil, fatty acid methyl ester	34	OPE	
Palm oil, methyl ester, *see* Palm oil, fatty acid methyl ester	34	OPE	
Penetrating	33	OPT	
Pine	33	OPI	
Range	33	ORG	
Residual	33		
Resin	33	ORS	
Resinous petroleum	33		
Road	33	ORD	
Rosin	33	ORN	
Seal	34		
Soapstock	34	OIS	
Soybean (epoxidized)	40		EVO
Sperm	33	OSP	
Spindle	33	OSD	
Spray	33	OSY	
Tall	34	OTL	
Tall, fatty acid	[2]34	TOF	
Tanner's	33	OTN	
Transformer	33	OTF	
Tung	34	OTG	
Turbine	33	OTB	
White (mineral)	33		
Olefin mixtures	30		OFX/OFY
alpha-Olefins (C6 - C18) mixtures	30	OAM	
alpha-Olefins (C13 and above)	30		
Oleic acid	34	OLA	
Oleum	[1, 2]0	OLM	
Oxyalkylated alkyl phenol formaldehyde	33		
Palm kernel oil, fatty acid	34	PNO	
Palm kernel oil, fatty acid methyl ester	34	PNF	
Palm stearin	34	PMS	
n-Paraffins (C10 - C20)	31	PFN	DCC/DOC/TR
Paraldehyde	19	PDH	
Pentachloroethane	36	PCE	
Pentadecanol	20	PDC	
1,3-Pentadiene	30	PDE	PDN
Pentaethylenehexamine, Tetraethylenepentamine mixture	7	PEP	
Pentane	31	PTY	IPT/PTA
Pentene	30	PTX	PTE
Pentene, Miscellaneous hydrocarbon mixture	[2]30		
3-Pentenenitrile	37	PNT	
Pentyl aldehyde	19		
Perchloroethylene	36	PER	
Petrolatum	33	PTL	
Phenol	21	PHN	
1-Phenyl-1-xylyl ethane	32	PXE	
Phosphoric acid	1	PAC	
Phosphorus	[1]0		PPW/PPR/PP
Phthalic anhydride	11	PAN	
Pinene	30	PIN	
Pine oil	33	OPI	
Polyalkenyl succinic anhydride amine	33		
Polyalkylene glycols, Polyalkylene glycol monoalkyl ethers mixtures	40	PPX	
Polyalkyl(C18 - C22) acrylate in Xylene	14	PIX	
Polyalkylene oxide polyol	20	PAO	
Polybutadiene, hydroxyl terminated	20		
Polybutene	30	PLB	
Polydimethylsiloxane	34		

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Polyethylene glycol	40		
Polyethylene glycol dimethyl ether	40		
Polyethylene glycol monoalkyl ether	40	PEE	
Polyethylene polyamines	[2]7	PEB	
Polyferric sulfate solution	34	PSS	
Polyglycerol	20		GCR
Polymethylene polyphenyl isocyanate	12	PPI	
Polymethylsiloxane	34		
Poly(20)oxyethylene sorbitan monooleate	34	PSM	
Polypropylene	30	PLP	
Polypropylene glycol	40	PGC	
Polypropylene glycol methyl ether	40	PGM	
Polysiloxane	34		
Potassium hydroxide solution	[2]5		CPS
Potassium oleate	34	POE	
Propane	31	PRP	
Propanolamine	8	PAX	MPA/PLA
Propionaldehyde	19	PAD	
Propionic acid	4	PNA	
Propionic anhydride	11	PAH	
Propionitrile	37	PCN	
n-Propoxypropanol	40	PXP	
Propyl acetate	34		IAC/PAT
Propyl alcohol	[2]20		IPA/PAL
Propylamine	7		IPP/PRA/IPO
Propylbenzene	32	PBZ	
iso-Propylcyclohexane	31	IPX	
Propylene	30	PPL	
Propylene-butylene copolymer	30	PBP	
Propylene dimer	30	PDR	
Propylene glycol	[2]20	PPG	
Propylene glycol monoalkyl ether	40	PGE	PME/PGY
Propylene glycol ethyl ether	40	PGY	PGE
Propylene glycol methyl ether	40	PME	PGE
Propylene oxide	16	POX	
Propylene tetramer	30	PTT	
Propylene trimer	30	PTR	
Propyl ether	41		IPE/PRE
Pseudocumene	32		TME/TRE
Pyridine	9	PRD	
Pyridine bases	9	PRB	
Rosin oil	33	ORN	
Rosin soap (disproportionated) solution	43	RSP	
Rum	20		
Salicylaldehyde	19	SAL	
Sewage sludge	43		
Sodium acetate solution	34	SAN	
Sodium alkyl sulfonate solution	43	SSU	
Sodium aluminate solution	5	SAU	
Sodium benzoate solution	34	SBN	
Sodium borohydride, Sodium hydroxide solution	5	SBX	SBH/SBI
Sodium carbonate solutions	5	SCE	
Sodium chlorate solution	[1, 2]0	SDD	SDC
Sodium cyanide solution	5	SCS	SCN
Sodium dichromate solution	[1, 2]0	SDL	SCR
Sodium dimethyl naphthalene sulfonate solution	[2]34		DNS
Sodium hydrogen sulfide, Sodium carbonate solution	[2]0	SSS	
Sodium hydrogen sulfite solution	43	SHX	
Sodium hydrosulfide solution	[2]5	SHR	
Sodium hydrosulfide, Ammonium sulfide solution	[2]5	SSA	
Sodium hydroxide solution	[2]5		CSS
Sodium hypochlorite solution	5	SHP	SHC
Sodium 2-mercaptobenzothiazol solution	5	SMB	
Sodium naphthalene sulfonate solution	34	SNS	
Sodium nitrite solution	5	SNI	SNT
Sodium polyacrylate solution	[2]43		
Sodium salt of Ferric hydroxyethylethylenediaminetriacetic acid solution	43	STA	FHX
Sodium silicate solution	[2]43	SSN	SSC
Sodium sulfide, Hydrosulfide solution	[1, 2]0		SSH/SSI/SSJ

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CH codes
Sodium thiocyanate solution	[1] [2]0	STS	SCY
Sorbitol solutions	20		SBT
Stearic acid	34	SRA	
Styrene	30	STY	STX
Sulfolane	39	SFL	
Sulfur	[1]0	SXX	
Sulfuric acid	[2]2	SFA	
Sulfuric acid, spent	2	SAC	
Tall oil	34	OTL	
Tall oil soap (disproportionated) solution	43	TOS	
Tallow	[2]34	TLO	
Tallow fatty acid	[2]34	TFD	
Tallow fatty alcohol	20	TFA	
Tallow nitrile	37		
1,1,2,2-Tetrachloroethane	36	TEC	
Tetradecanol	20	TTN	
Tetradecene	30	TTD	
Tetradecylbenzene	32	TDB	AKB
Tetraethylene glycol	40	TTG	
Tetraethylenepentamine	7	TTP	
Tetrahydrofuran	41	THF	
Tetrahydronaphthalene	32	THN	
1,2,3,5-Tetramethylbenzene	32	TTB	
Tetrasodium salt of EDTA solution	43		EDS
Titanium tetrachloride	2	TTT	
Toluene	32	TOL	
Toluenediamine	9	TDA	
Toluene diisocyanate	12	TDI	
o-Toluidine	9	TLI	
Triarylphosphate	34		
Tributyl phosphate	34	TBP	
1,2,4-Trichlorobenzene	36	TCB	
1,1,1-Trichloroethane	[2]36	TCE	
1,1,2-Trichloroethane	36	TCM	
Trichloroethylene	[2]36	TCL	
1,2,3-Trichloropropane	36	TCN	
1,1,2-Trichloro-1,2,2-trifluoroethane	36	TTF	
Tricresyl phosphate	34		TCO/TCP
Tridecane	31	TRD	PFN
Tridecanol	20	TDN	
Tridecene	30	TDC	
Tridecylbenzene	32	TRB	AKB
Triethanolamine	[1]8	TEA	
Triethylamine	7	TEN	
Triethylbenzene	32	TEB	
Triethylene glycol	40	TEG	
Triethylene glycol butyl ether	40		
Triethylene glycol butyl ether mixture	40		
Triethylene glycol di-(2-ethylbutyrate)	34	TGD	
Triethylene glycol ether mixture	40		
Triethylene glycol ethyl ether	40	TGE	
Triethylenetetramine	[2]7	TET	
Triethyl phosphate	34	TPS	
Triethyl phosphite	[2]34	TPI	
Triisobutylene	30	TIB	
Triisooctyl trimellitate	34		
Triisopropanolamine	8	TIP	
Triisopropanolamine salt of 2,4-Dichlorophenoxyacetic acid solution	43		DTI
Trimethylacetic acid	4	TAA	
Trimethylbenzene	32	TRE	TME/TMB/TM
Trimethylhexamethylenediamine (2,2,4- and 2,4,4-)	7	THA	
Trimethylhexamethylene diisocyanate (2,2,4- and 2,4,4-)	12	THI	
Trimethylol propane polyethoxylate	20	TPR	
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate	34		
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate	34	TMP	
2,2,4-Trimethyl-3-pentanol-1-isobutyrate	34		
Trimethyl phosphite	[2]34	TPP	
Tripropylene	30		
Tripropylene glycol	40	TGC	

TABLE I—ALPHABETICAL LIST OF CARGOES—Continued

Chemical name	Group No.	CHRIS code	Related CHRIS codes
Tripropylene glycol methyl ether	40	TGM	
Trisodium nitrilotriacetate	34		
Trixylenyl phosphate	34	TRP	
Turpentine	30	TPT	
Undecanoic acid	4	UDA	
Undecanol	20		UND
Undecene	30	UDC	
Undecyl alcohol	20	UND	
Undecylbenzene	32	UDB	AKB
Urea, Ammonium mono- and di-hydrogen phosphate, Potassium chloride solution	0	UPX	
Urea, Ammonium nitrate solution (containing Ammonia)	6	UAS	
Urea, Ammonium nitrate solution (not containing Ammonia)	43	ANU	
Urea, Ammonium phosphate solution	43	UAP	
Valeraldehyde	19		IVA/VAL/VAK
Vanillin black liquor	5	VBL	
Vegetable protein solution	43		
Vinyl acetate	13	VAM	
Vinyl acetate-Fumarate copolymer	34		
Vinyl chloride	35	VCM	
Vinyl ethyl ether	13	VEE	
Vinylidene chloride	35	VCI	
Vinyl neodecanate	13	VND	
Vinyltoluene	13	VNT	
Waxes:		WAX	
Carnauba	34	WCA	
Paraffin	31	WPF	
White spirit (low (15-20%) aromatic)	33	WSL	WSP
Xylene	32	XLX	XLM/XLO/XLP
Xylenols	21	XYL	
Zinc bromide, Calcium bromide solution *see* Drilling brine (containing Zinc salts)	43		DZB

[1] Because of very high reactivity or unusual conditions of carriage or potential compatibility problems, this product is not assigned to a specific group in the Compatibility Chart. For additional compatibility information, contact Commandant (G-MTH), U.S. Coast Guard, 2100 Second Street, SW., Washington, D.C. 20593-0001 Telephone (202) 267-1577.

[2] See Appendix I—Exceptions to the Chart.

[CGD 88-100, 54 FR 40012, Sept. 29, 1989]

TABLE II—GROUPING OF CARGOES

0. UNASSIGNED CARGOES

Acetone cyanohydrin [1,2]
Alkylbenzenesulfonic acid [1,2]
Aluminium chloride, Hydrochloric acid solution [1]
Ammonium hydrogen phosphate solution [1]
Ammonium nitrate solution [1]
Ammonium thiocyanate, Ammonium thiosulfate solution [1]
Benzenesulfonyl chloride [1,2]
gamma-Butyrolactone [1,2]
Chlorine [1]
Chlorosulfonic acid [1]
2,4-Dichlorophenoxyacetic acid, Dimethylamine salt solution [1,2]
Dimethylamine salt of 2,4-Dichlorophenoxyacetic acid solution [1,2]
Diphenylol propane-Epichlorohydrin resins [1]
Dodecylbenzenesulfonic acid [1,2]
Ethyl chlorothioformate [1,2]
Ethylene oxide [1]
2-Hydroxyethyl acrylate [1,2]
Magnesium chloride solution [1,2]
Molasses residue [1]
Motor fuel antiknock compounds containing Lead alkyls [1]
Naphthalene sulfonic acid-formaldehyde copolymer, sodium salt solution [1]
Nitrating acid [1]
Nitric acid (greater than 70%) [1]
o-Nitrophenol [1,2]
Noxious Liquid Substance, n.o.s. (NLS's) [1]
Oleum [1,2]
Phosphorus [1]
Sodium chlorate solution [1,2]
Sodium dichromate solution [1,2]
Sodium hydrogen sulfide, Sodium carbonate solution [1,2]
Sodium sulfide, Hydrosulfide solution [1,2]
Sodium thiocyanate solution [1,2]
Sulfur [1]
Urea, Ammonium mono- and di-hydrogen phosphate, Potassium chloride solution

1. NON-OXIDIZING MINERAL ACIDS

Di-(2-ethylhexyl)phosphoric acid
Ferric chloride solution
Hydrochloric acid
Hydrochloric acid, spent
Hydrofluorosilicic acid
Phosphoric acid

2. SULFURIC ACIDS

Sulfuric acid [2]
Sulfuric acid, spent
Titanium tetrachloride

3. NITRIC ACID

Ferric nitrate, Nitric acid solution
Nitric acid (70% or less)

4. ORGANIC ACIDS

Acetic acid [2]
Acrylic acid [2]
Butyric acid
Cashew nut shell oil (untreated)
Chloroacetic acid solution
Chloropropionic acid
Cyclohexane oxidation product acid water
Decanoic acid
2,2-Dichloropropionic acid
2,2-Dimethyloctanoic acid
2-Ethylhexanoic acid
Formic acid [2]
n-Heptanoic acid
Hexanoic acid
2-Hydroxy-4-(methylthio)butanoic acid
Methacrylic acid
Naphthenic acid
Neodecanoic acid
Nonanoic acid
Octanoic acid
Propionic acid
Trimethylacetic acid
Undecanoic acid

5. CAUSTICS

Ammonium sulfide solution
Calcium hypochlorite solutions
Caustic potash solution [2]
Caustic soda solution [2]
Cresylate spent caustic
Cresylic acid, sodium salt solution
Kraft black liquor
Kraft pulping liquors
Mercaptobenzothiazol, sodium salt solution
Potassium hydroxide solution [2]
Sodium aluminate solution
Sodium borohydride, Sodium hydroxide solution
Sodium carbonate solutions
Sodium cyanide solution
Sodium hydrosulfide solution [2]
Sodium hydrosulfide, Ammonium sulfide solution [2]
Sodium hydroxide solution [2]
Sodium hypochlorite solution
Sodium 2-mercaptobenzothiazol solution
Sodium nitrite solution
Vanillin black liquor

6. AMMONIA

Ammonia, anhydrous
Ammonium hydroxide (28% or less Am monia)
Ammonium nitrate, Urea solution (co taining Ammonia)
Urea, Ammonium nitrate solution (co taining Ammonia)

7. ALIPHATIC AMINES

N-Aminoethylpiperazine
Butylamine
Cyclohexylamine
Dibutylamine
Diethylamine [2]
Diethylenetriamine
Diisobutylamine
Diisopropylamine
Dimethylamine
Dimethylamine solution
N,N-Dimethylcyclohexylamine
Di-n-propylamine
Dodecylamine, Tetradecylamine mixtu [2]
Ethylamine [2]
Ethylamine solution
N-Ethyl-n-butylamine
N-Ethyl cyclohexylamine
Ethylenediamine [2]
2-Ethyl hexylamine
Hexamethylenediamine solution
Hexamethylenetetramine
Hexamethylenetetramine solutions
Hexamethylenimine
Isophorone diamine
Metam sodium solution
Methylamine
Methylamine solutions
Morpholine [2]
Pentaethylenehexamine, Tetraethylen pentamine mixture
Polyethylene polyamines [2]
Propylamine
Tetraethylenepentamine
Triethylamine
Triethylenetetramine [2]
Trimethylhexamethylene diamine (2,2,4 and 2,4,4-)

8. ALKANOLAMINES

2-(2-Aminoethoxy)ethanol
Aminoethyldiethanolamine, Aminoeth lethanolamine solution
Aminoethylethanolamine
2-Amino-2-methyl-1-propanol
Diethanolamine
Diethylaminoethanol
Diethylethanolamine
Diisopropanolamine
Dimethylethanolamine
Ethanolamine
Propanolamine

Triethanolamine [2]
Triisopropanolamine

9. AROMATIC AMINES

Aniline
4-Chloro-2-methylphenoxyacetic acid, Dimethylamine salt solution
2,6-Diethylaniline
Dimethylamine salt of 4-Chloro-2-methylphenoxyacetic acid solution
2,6-Dimethylaniline
2-Ethyl-6-methyl-N-(1'-methyl-2-methoxyethyl)aniline
4,4'-Methylene dianiline (43% or less), Polymethylene polyphenylamine, o-Dichlorobenzene mixtures
2-Methyl-6-ethyl aniline
2-Methyl-5-ethyl pyridine
Methyl pyridine
3-Methylpyridine
N-Methyl pyrrolidone
Pyridine
Pyridine bases
Toluenediamine
p-Toluidine

10. AMIDES

Acrylamide solution
N,N-Dimethylacetamide
N,N-Dimethylacetamide solution
Dimethylformamide
Formamide
Octadecenoamide

11. ORGANIC ANHYDRIDES

Acetic anhydride
Maleic anhydride
Phthalic anhydride
Propionic anhydride

12. ISOCYANATES

Diphenylmethane diisocyanate
Isophorone diisocyanate
Polymethylene polyphenyl isocyanate
Toluene diisocyanate
Trimethylhexamethylene diisocyanate (2,2,4- and 2,4,4-)

13. VINYL ACETATE

Vinyl acetate
Vinyl ethyl ether
Vinyl neodecanate
Vinyl toluene

14. ACRYLATES

Butyl acrylate
Butyl methacrylate
Butyl methacrylate, Decyl methacrylate, Cetyl-Eicosyl methacrylate mixture
Cetyl-Eicosyl methacrylate mixture
Decyl acrylate
Dodecyl methacrylate
Dodecyl-Pentadecyl methacrylate mixture
Ethyl acrylate
2-Ethylhexyl acrylate
Ethyl methacrylate
Methyl acrylate
Methyl methacrylate
Nonyl methacrylate
Polyalkyl(C18 - C22) acrylate in Xylene

15. SUBSTITUTED ALLYLS

Acrylonitrile [2]
Allyl alcohol [2]
Allyl chloride
1,3-Dichloropropene
Dichloropropene, Dichloropropane mixtures
Methacrylonitrile

16. ALKYLENE OXIDES

Butylene oxide
Ethylene oxide, Propylene oxide mixtures
Propylene oxide

17. EPICHLOROHYDRIN

Chlorohydrins
Epichlorohydrin

18. KETONES

Acetone [2]
Acetophenone
Amyl methyl ketone
Butyl heptyl ketone
Camphor oil
Cyclohexanone
Cyclohexanone, Cyclohexanol mixtures [2]
Diisobutyl ketone
Ethyl amyl ketone
Epoxy resin
Ketone residue
Isophorone [2]
Mesityl oxide [2]
Methyl amyl ketone
Methyl butyl ketone
Methyl butyl ketone
Methyl diethanolamine
Methyl ethyl ketone [2]
Methyl heptyl ketone
Methyl isoamyl ketone
Methyl isobutyl ketone [2]

19. ALDEHYDES

Acetaldehyde
Acrolein [2]
Butyraldehyde
Crotonaldehyde [2]
Decaldehyde
Ethylhexaldehyde
2-Ethyl-3-propylacrolein [2]
Formaldehyde, Methanol mixtures [2]
Formaldehyde solution [2]
Furfural
Glutaraldehyde solution
Glyoxal solutions
3-Methyl butyraldehyde
Methylolureas
Octyl aldehyde
Paraldehyde
Pentyl aldehyde

Propionaldehyde
Salicylaldehyde
Valeraldehyde

20. ALCOHOLS, GLYCOLS

Acrylonitrile-Styrene copolymer dispersion in Polyether polyol
Alcoholic beverages
Alcohol polyethoxylates
Alcohol polyethoxylates, secondary
Alcohols (C13 and above)
Amyl alcohol
Behenyl alcohol
Brake fluid base mixtures
Butyl alcohol [2]
Butylene glycol [2]
Choline chloride solutions
Cyclohexanol
Decyl alcohol [2]
Diacetone alcohol [2]
Diisobutyl carbinol
2,2-Dimethylpropane-1,3-diol
Dodecanol
Dodecyl alcohol
Ethoxylated alcohols, C11-C15
2-Ethoxyethanol
Ethyl alcohol [2]
Ethyl butanol
Ethylene chlorohydrin
Ethylene cyanohydrin
Ethylene glycol [2]
2-Ethylhexanol
Furfuryl alcohol [2]
Glycerine [2]
Heptanol
Hexanol
Hexylene glycol
3-Methoxy-1-butanol
Methyl alcohol [2]
Methyl amyl alcohol
Methyl butenol
Methylbutynol
2-Methyl-2-hydroxy-3-butyne
Methyl isobutyl carbinol
3-Methyl-3-methoxybutanol
Molasses
Nonyl alcohol [2]
Octyl alcohol [2]
Pentadecanol
Polyalkylene oxide polyol
Polybutadiene, hydroxyl terminated
Polyglycerol
Propyl alcohol [2]
Propylene glycol [2]
Rum
Sorbitol solutions
Tallow fatty alcohol
Tetradecanol
Tridecanol
Trimethylol propane polyethoxylate
Undecanol
Undecyl alcohol

21. PHENOLS, CRESOLS

Benzyl alcohol
Carbolic oil
Creosote [2]
Cresols
Cresylic acid
2,4-Dichlorophenol
Dodecyl phenol
o-Ethylphenol
Nonyl phenol
Octyl phenol
Phenol
Xylenols

22. CAPROLACTAM SOLUTIONS

Caprolactam solution

23-29. UNASSIGNED

30. OLEFINS

Amylene
Butadiene
Butadiene, Butylene mixtures (cont. Ac tylenes)
Butene
Butene oligomer
Butylene
1,5,9-Cyclododecatriene
1,3-Cyclopentadiene dimer
Cyclopentadiene polymers
Cyclopentadiene, Styrene, Benzene mi ture
Cyclopentene
Decene
Dicyclopentadiene
Diisobutylene
Dipentene
Dodecene
Ethylene
Ethylidene norbornene [2]
1-Heptene
Hexene
Isoprene
Methyl acetylene, Propadiene mixture
Methylcyclopentadiene dimer
2-Methyl-1-pentene
4-Methyl-1-pentene
alpha-Methyl styrene
Myrcene
Nonene
1-Octadecene
Octene
Olefin mixtures
alpha-Olefins (C6 - C18) mixtures
alpha-Olefins (C13 and above)
1,3-Pentadiene
Pentene
Pentene, Miscellaneous hydrocarbon mi ture [2]
Pinene
Polybutene
Polypropylene
Propylene
Propylene-butylene copolymer
Propylene dimer
Propylene tetramer
Propylene trimer
Styrene
Tetradecene

Tridecene
Triisobutylene
Tripropylene
Turpentine
Undecene

31. PARAFFINS

Butane
Cycloaliphatic resins
Cycloheptane
Cyclohexane
Cyclopentane
Decane
Dodecane
Ethane
Heptane
Hexane [2]
Methane
Methylcyclohexane
2-Methyl pentane
Nonane
Octane
n-Paraffins (C10 - C20)
Pentane
Propane
iso-Propylcyclohexane
Tridecane
Waxes:
  Paraffin

32. AROMATIC HYDROCARBONS

Alkyl acrylate-Vinyl pyridine copolymer in Toluene
Alkyl(C9 - C17) benzenes
Benzene
Benzene hydrocarbon mixtures (having 10% Benzene or more)
Benzene, Toluene, Xylene mixtures
Butylbenzene
Butyl phenol, Formaldehyde resin in Xylene
Butyl toluene
Cumene
Cymene
Decylbenzene
Dialkyl(C10 - C14) benzenes
Diethylbenzene
Diisopropylbenzene
Diisopropyl naphthalene
Diphenyl
Dodecylbenzene
Ethylbenzene
Ethyl toluene
Isopropylbenzene
Methyl naphthalene
Naphthalene
1-Phenyl-1-xylyl ethane
Propylbenzene
Pseudocumene
Tetradecylbenzene
Tetrahydronaphthalene
1,2,3,5-Tetramethylbenzene
Toluene
Tridecylbenzene
Triethylbenzene
Trimethylbenzene
Undecylbenzene
Xylene

33. MISCELLANEOUS HYDROCARBON MIXTURES

Alkylbenzenesulfonic acid, sodium salt solutions
Asphalt blending stocks, roofers flux
Asphalt blending stocks, straight run residue
Aviation alkylates
Calcuim sulfonate, Calcium carbonate, Hydrocarbon solvent mixture
Carbon black base
Coal tar
Coal tar pitch
Decahydronaphthalene
Diphenyl, Diphenyl ether
Distillates, flashed feed stocks
Distillates, straight run
Drilling mud (low toxicity) (*if flammable or combustible*)
Fatty acid amides
Gas oil, cracked
Gasoline blending stock, alkylates
Gasoline blending stock, reformates
Gasolines:
  Automotive (*not over 4.23 grams lead per gal.*)
  Aviation (*not over 4.86 grams lead per gal.*)
  Casinghead (*natural*)
  Polymer
  Straight run
Glycols, Resins, and Solvents mixture
Herbicide (C15-H22-NO2-Cl)
Jet Fuels:
  JP-1
  JP-3
  JP-4
  JP-5
  JP-8
Kerosene
Magnesium nonyl phenol sulfide
Maleic anhydride copolymer
Mineral spirits
Naphtha:
  Coal tar solvent
  Cracking fraction [3]
  Petroleum
  Solvent
  Stoddard solvent
  Varnish Makers' and Painters'
Nonyl phenolsulfide solution
Oil, fuel:
  No. 1
  No. 1-D
  No. 2
  No. 2-D
  No. 4
  No. 5
  No. 6
Oil, misc:
  Absorption
  Aliphatic
  Aromatic
  Clarified

  - Coal
  - Crude
  - Diesel
  - Heartcut distillate
  - Linseed
  - Lubricating
  - Mineral
  - Mineral seal
  - Motor
  - Neatsfoot
  - Penetrating
  - Pine
  - Range
  - Resin
  - Resinous petroleum
  - Rosin
  - Sperm
  - Spindle
  - Spray
  - Tanner's
  - Turbine
  - White (mineral)
  - Residual
  - Road
  - Transformer
- Oxyalkylated alkyl phenol formaldehyde
- Petrolatum
- Pine oil
- Polyalkenyl succinic anhydride amine
- White spirit (low (15-20%) aromatic)

34. ESTERS

- Acetyl tributyl citrate
- Alkyl phthalates
- Amyl acetate
- Amyl tallate
- Benzene tricarboxylic acid trioctyl ester
- Benzyl acetate
- Butyl acetate
- Butyl benzyl phthalate
- n-Butyl butyrate
- Butyl formate
- iso-Butyl isobutyrate
- Calcium naphthenate in Mineral oil
- Calcium nitrate, Magnesium nitrate, Potassium chloride solution
- Coconut oil, fatty acid
- Cottonseed oil, fatty acid
- Cyclohexyl acetate
- Dialkyl(C7 - C13) phthalates
- Dibutyl phthalate
- Diethylene glycol butyl ether acetate
- Diethylene glycol ethyl ether acetate
- Diethylene glycol methyl ether acetate
- Diethylene glycol phthalate
- Di-(2-ethylhexyl)adipate
- Di-(2-ethylhexyl)phthalate
- Diethyl phthalate
- Diethyl sulfate
- Diheptyl phthalate
- Di-n-hexyl adipate
- Diisobutyl phthalate
- Diisodecyl phthalate
- Diisononyl adipate
- Diisononyl phthalate
- Diisooctyl phthalate
- Dimethyl adipate
- Dimethylcyclicsiloxane hydrolyzate
- Dimethyl glutarate
- Dimethyl hydrogen phosphite [1]
- Dimethyl naphthalene sulfonic acid sodium salt solution [2]
- Dimethyl phthalate
- Dimethyl polysiloxane
- Dimethyl succinate
- Dinonyl phthalate
- Dioctyl phthalate
- Dipropylene glycol dibenzoate
- Ditridecyl phthalate
- 2-Dodecenylsuccinic acid, dipotassium sa solution
- Diundecyl phthalate
- 2-Ethoxyethyl acetate
- Ethyl acetate
- Ethyl acetoacetate
- Ethyl butyrate
- Ethylene glycol acetate
- Ethylene glycol butyl ether acetate
- Ethylene glycol diacetate
- Ethylene glycol ethyl ether acetate
- Ethylene glycol methyl ether acetate
- Ethyl-3-ethoxypropionate
- Ethyl hexyl phthalate
- Ethyl hexyl tallate
- Ethyl propionate
- Ethyl propionate
- Fatty acids (saturated, C13 and above)
- Glycerol polyalkoxylate
- Glyceryl triacetate
- Gylcidyl ester of tridecylacetic acid
- Glycidyl ester of Versatic acid
- Glycol diacetate
- Heptyl acetate
- Hexyl acetate
- Lauric acid
- Magnesium sulfonate
- 3-Methoxybutyl acetate
- 1-Methoxy-2-propyl acetate
- Methyl acetate
- Methyl acetoacetate
- Methyl amyl acetate
- Methyl butyrate
- Methyl formate
- 3-Methyl-3-methoxybutyl acetate
- Methyl salicylate
- Metolachlor
- Naphthalene sulfonic acid, sodium salt solution (40% or less)
- Octyl decyl adipate
- Octyl epoxytallate
- Octyl nitrate [2]
- Oil, edible:
  - Babassu
  - Castor
  - Coconut [2]
  - Corn
  - Cotton seed
  - Fish [2]
  - Lard
  - Olive
  - Palm [2]
  - Palm kernel
  - Peanut

Rapeseed
Rice bran
Safflower
Soya bean
Sunflower
Sunflower seed
Tucum
Vegetable
Oil, misc:
Coconut oil, fatty acid methyl ester
Cotton seed oil, fatty acid
Palm oil, fatty acid methyl ester
Palm oil, methyl ester
Soapstock
Tall
Tall, fatty acid [2]
Tung
Oleic acid
Palm kernel oil, fatty acid
Palm kernel oil, fatty acid methyl ester
Palm stearin
Polydimethylsiloxane
Polyferric sulfate solution
Polymethylsiloxane
Poly(20)oxyethylene sorbitan monooleate
Polysiloxane
Potassium oleate
Propyl acetate
Sodium acetate solution
Sodium benzoate solution
Sodium dimethyl naphthalene sulfonate solution [2]
Sodium naphthalene sulfonate solution
Stearic acid
Tall oil
Tallow [2]
Tallow fatty acid [2]
Triarylphosphate
Tributyl phosphate
Tricresyl phosphate
Triethylene glycol di-(2-ethylbutyrate)
Triethyl phosphate
Triethyl phosphite [2]
Triisooctyl trimellitate [2]
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate
2,2,4-Trimethyl-3-pentanol-1-isobutyrate
Trimethyl phosphite [2]
Trisodium nitrilotriacetate
Trixylenyl phosphate
Vinyl acetate-Fumarate copolymer
Waxes:
Carnauba

35. Vinyl Halides

Vinyl chloride
Vinylidene chloride

36. Halogenated Hydrocarbons

Benzyl chloride
Carbon tetrachloride
Chlorinated paraffins (C10 - C13)
Chlorinated paraffins (C14 - C17)
Chlorobenzene
Chlorodifluoromethane
Chloroform
Chlorotoluene
Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
2,2'-Dichloroisopropyl ether
Dichloromethane
Dichloropropane
Ethyl chloride
Ethylene dibromide
Ethylene dichloride [2]
Methyl bromide
Methyl chloride
Monochlorodifluoromethane
Pentachloroethane
Perchloroethylene
1,1,2,2-Tetrachloroethane
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane [2]
1,1,2-Trichloroethane
Trichloroethylene [2]
1,2,3-Trichloropropane
1,1,2-Trichloro-1,2,2-trifluoroethane

37. Nitriles

Acetonitrile
Adiponitrile
Lactonitrile solution
3-Pentenenitrile
Propionitrile
Tallow nitrile

38. Carbon Disulfide

Carbon disulfide

39. Sulfolane

Sulfolane

40. Glycol Ethers

Diethylene glycol
Diethylene glycol butyl ether
Diethylene glycol dibutyl ether
Diethylene glycol ethyl ether
Diethylene glycol methyl ether
Diethylene glycol phenyl ether
Dipropylene glycol
Dipropylene glycol methyl ether
Ethoxy triglycol
Ethylene glycol tert-butyl ether
Ethylene glycol butyl ether
Ethylene glycol dibutyl ether
Ethylene glycol ethyl ether
Ethylene glycol isopropyl ether
Ethylene glycol methyl ether
Ethylene glycol phenyl ether
Ethylene glycol phenyl ether, Diethylene glycol phenyl ether mixture
Ethylene glycol propyl ether
Methoxy triglycol
Nonyl phenol (ethoxylated)
Nonyl phenol poly(4-12)ethoxylates
Oil, misc:
Soybean (epoxidized)

Polyalkylene glycols, Polyalkylene glycol monoalkyl ethers mixtures
Polyethylene glycols
Polyethylene glycol dimethyl ether
Polyethylene glycol monoalkyl ether
Polypropylene glycol methyl ether
Polypropylene glycols
n-Propoxypropanol
Propylene glycol monoalkyl ether
Propylene glycol ethyl ether
Propylene glycol methyl ether
Tetraethylene glycol
Triethylene glycol
Triethylene glycol butyl ether
Triethylene glycol butyl ether mixture
Triethylene glycol ether mixture
Triethylene glycol ethyl ether
Tripropylene glycol
Tripropylene glycol methyl ether

41. ETHERS

Butyl ether
2,2'-Dichloroethyl ether
Digylcidyl ether of Bisphenol A
Diglycidyl ether of Bisphenol F
Dimethyl furan
1,4-Dioxane
Diphenyl ether
Diphenyl ether, Diphenyl phenyl ether mixture
Ethyl ether
Methyl-tert-butyl ether [2]
Methyl formal
Propyl ether
Tetrahydrofuran

42. NITROCOMPOUNDS

Dinitrotoluene
Nitrobenzene
o-Nitrochlorobenzene
Nitroethane
Nitropropane
Nitropropane, Nitroethane mixture
Nitrotoluene

43. MISCELLANEOUS WATER SOLUTIONS

Aluminum sulfate solution [2]
2-Amino-2-hydroxymethyl-1,3-propanediol solution
Ammonium bisulfite solution [2]
Ammonium nitrate, Urea solution (not containing Ammonia)
Ammonium polyphosphate solution
Ammonium sulfate solution
Ammonium thiosulfate solution
Calcium bromide solution
Calcium chloride solution
Corn syrup
Dextrose solution
Diammonium salt of Zinc EDTA solution
2,4-Dichlorophenoxyacetic acid, Diethanolamine salt solution
2,4-Dichlorophenoxyacetic acid, Triisopropanolamine salt solution [2]
Didecyl dimethyl ammonium chloride, Ethanol mixture solution
Diethanolamine salt of 2,4-Dichlorophenoxyacetic acid solution
Dodecyl diphenyl ether disulfonate solution
Drilling brine (containing Calcium, Potassium, or Sodium salts)
Drilling brine (containing Zinc salts)
Drilling mud (low toxicity) (*if non-flammable or non-combustible*)
Ethylenediaminetetracetic acid, tetrasodium salt solution
Ethylene-Vinyl acetate copolymer emulsion
Ferric hydroxyethylethylenediamine triacetic acid, trisodium salt solution [2]
Fish solubles (*water based fish meal extracts*)
Fructose solution
Fumaric adduct of Rosin, water dispersion
N-(Hydroxyethyl)ethylene diamine triacetic acid, trisodium salt solution
Kaolin clay slurry
Latex, liquid synthetic
Lignin liquor
Naphthenic acid, sodium salt solution
Rosin soap (disproportionated) solution
Sewage sludge, treated
Sodium alkyl sulfonate solution
Sodium hydrogen sulfite solution
Sodium polyacrylate solution [2]
Sodium salt of Ferric hydroxyethylethylenediamine triacetic acid solution
Sodium silicate solution [2]
Tall oil soap (disproportionated) solution
Tetrasodium salt of EDTA solution
Triisopropanolamine salt of 2,4-Dichlorophenoxyacetic acid solution
Urea, Ammonium nitrate solution (not containing Ammonia)
Urea, Ammonium phosphate solution
Vegetable protein solution (hydrolysed)

FOOTNOTES TO TABLE II

[1] Because of very high reactivity or unusual conditions of carriage or potential compatibility problems, this product is not assigned to a specific group in the Compatibility Chart. For additional compatibility information, contact Commandant (G-MTH), U.S. Coast Guard, 2100 Second Street, SW. Washington, DC 20593-0001. Telephone (202) 267-1577.

[2] See Appendix I—Exceptions to the Chart.

[CGD 88-100, 54 FR 40012, Sept. 29, 1989, as amended by CGD 88-100, 55 FR 17276, Apr. 24, 1990]

APPENDIX I—EXCEPTIONS TO THE CHART

(a). The binary combinations listed below have been tested as prescribed in Appendix III and found not to be dangerously reactive. These combinations are exceptions to the Compatibility Chart (Figure 1) and may be stowed in adjacent tanks.

Member of reactive group	Compatible with
Acetone (18)	Diethylenetriamine (7)
Acetone cyanohydrin (0)	Acetic acid (4)
Acrylonitrile (15)	Triethanolamine (8)
1,3-Butylene glycol (20)	Morpholine (7)
1,4-Butylene glycol (20)	Ethylamine (7) Triethanolamine (8)
Caustic potash, 50% or less (5).	Ethyl alcohol (20) Ethylene glycol (20) Isopropyl alcohol (20) Methyl alcohol (20) iso-Octyl alcohol (20)
Caustic soda, 50% or less (5).	Butyl alcohol (20) tert-Butyl alcohol, Methanol mixtures Decyl alcohol (20) Diacetone alcohol (20) Diethylene glycol (40) Ethyl alcohol (20) Ethyl alcohol (40%, whiskey) (20) Ethylene glycol (20) Ethylene glycol, Diethylene glycol mixture (20) Ethyl hexanol (Octyl alcohol) (20) Methyl alcohol (20) Nonyl alcohol (20) Propyl alcohol (20) Propylene glycol (20) Sodium chlorate (0) iso-Tridecanol (20)
Dodecyl and Tetradecylamine mixture (7).	Tall oil, fatty acid (34)
Ethylenediamine (7)	Butyl alcohol (20) tert-Butyl alcohol (20) Butylene glycol (20) Creosote (21) Diethylene glycol (40) Ethyl alcohol (20) Ethylene glycol (20) Ethyl hexanol (20) Glycerine (20) Isononyl alcohol (20) Isophorone (18) Methyl butyl ketone (18) Methyl iso-butyl ketone (18) Methyl ethyl ketone (18) Propyl alcohol (20) Propylene glycol (20)
Oleum (0)	Hexane (31) Dichloromethane (36) Perchloroethylene (36)
1,2-Propylene glycol (20)	Diethylenetriamine (7) Polyethylene polyamines (7) Triethylenetetramine (7)
Sulfuric acid (2)	Coconut oil (34) Coconut oil acid (34) Palm oil (34) Tallow (34)
Sulfuric acid, 98% or less (2)	Choice white grease tallow (34)

(b). The binary combinations listed below have been determined to be dangerously reactive, based on either data obtained in the literature or on laboratory testing which has been carried out in accordance with procedures prescribed in Appendix III. These combinations are exceptions to the Compatibility Chart (Figure 1) and may not be stowed in adjacent tanks.

Acetone cyanohydrin (0) is not compatible with Groups 1-12, 16, 17 and 22.

Acrolein (19) is not compatible with Group 1, Non-Oxidizing Mineral Acids.

Acrylic acid (4) is not compatible with Group 9, Aromatic Amines.

Alkylbenzenesulfonic acid (0) is not compatible with Groups 1-3, 5-9, 15, 16, 18, 19, 30, 34, 37, and strong oxidizers.

Allyl alcohol (15) is not compatible with Group 12, Isocyanates.

Aluminum sulfate solution (43) is not compatible with Groups 5-11.

Ammonium bisulfite solution (43) is not compatible with Groups 1, 3, 4, and 5.

Benzenesulfonyl chloride (0) is not compatible with Groups 5-7, and 43.

gamma-Butyrolactone (0) is not compatible with Groups 1-9.

Crotonaldehyde (19) is not compatible with Group 1, Non-Oxidizing Mineral Acids.

Cyclohexanone, Cyclohexanol mixture (18) is not compatible with Group 12, Isocyanates.

2,4-Dichlorophenoxyacetic acid, Triisopropanolamine salt solution (43) is not compatible with Group 3, Nitric Acid.

2,4-Dichlorophenoxyacetic acid, Dimethylamine salt solution (0) is not compatible with Groups 1-5, 11, 12, and 16.

Dimethyl hydrogen phosphite (34) is not compatible with Groups 1 and 4.

Dimethyl naphthalene sulfonic acid, sodium salt solution (34) is not compatible with Group 12, Formaldehyde, and strong oxidizing agents.

Dodecylbenzenesulfonic acid (0) is not compatible with oxidizing agents and Groups 1, 2, 3, 5, 6, 7, 8, 9, 15, 16, 18, 19, 30, 34, and 37.

Ethyl chlorothioformate (0) is not compatible with Groups 5, 6, 7, 8, and 9.

Ethylenediamine (7) is not compatible with Ethylene dichloride (36).

Ethylene dichloride (36) is not compatible with Ethylenediamine (7).

Ethylidene norbornene (30) is not compatible with Groups 1-3 and 5-8.

2-Ethyl-3-propylacrolein (19) is not compatible with Group 1, Non-Oxidizing Mineral Acids.

Ferric hydroxyethylethylenediamine triacetic acid, Sodium salt solution (43) is not compatible with Group 3, Nitric acid.

Fish oil (34) is not compatible with Sulfuric acid (2).

Formaldehyde (over 50%) in Methyl alcohol (over 30%) (19) is not compatible with Group 12, Isocyanates.

Formic acid (4) is not compatible with Furfural alcohol (20).

Furfuryl alcohol (20) is not compatible with Group 1, Non-Oxidizing Mineral Acids and Formic acid (4).

2-Hydroxyethyl acrylate is not compatible with Groups 2, 3, 5-8 and 12.

Isophorone (18) is not compatible with Group 8, Alkanolamines.

Magnesium chloride solution (0) is not compatible with Groups 2, 3, 5, 6 and 12.

Mesityl oxide (18) is not compatible with Group 8, Alkanolamines.

Methyl tert-butyl ether (41) is not compatible with Group 1, Non-oxidizing Mineral Acids.

Naphtha, cracking fraction (33) is not compatible with strong acids, caustics or oxidizing agents.

o-Nitrophenol (0) is not compatible with Groups 2, 3, and 5-10.

Octyl nitrates (all isomers) (34) is not compatible with Group 1, Non-oxidizing Mineral Acids.

Oleum (0) is not compatible with Sulfuric acid (2) and 1,1,1-Trichloroethane (36).

Pentene, Miscellaneous hydrocarbon mixtures (30) are not compatible with strong acids or oxidizing agents.

Sodium chlorate solution (50% or less) (0) is not compatible with Groups 1-3, 5, 7, 8, 10, 12, 13, 17 and 20.

Sodium dichromate solution (70% or less) (0) is not compatible with Groups 1-3, 5, 7, 8, 10, 12, 13, 17 and 20.

Sodium dimethyl naphthalene sulfonate solution (34) is not compatible with Group 12, Formaldehyde and strong oxidizing agents.

Sodium hydrogen sulfide, Sodium carbonate solution (0) is not compatible with Groups 6 (Ammonia) and 7 (Aliphatic amines).

Sodium hydrosulfide (5) is not compatible with Groups 6 (Ammonia) and 7 (Aliphatic amines).

Sodium hydrosulfide, Ammonium sulfide solution (5) is not compatible with Groups 6 (Ammonia) and 7 (Aliphatic amines).

Sodium polyacrylate solution (43) is not compatible with Group 3, Nitric Acid.

Sodium salt of Ferric hydroxyethyleth ediamine triacetic acid solution (4 not compatible with Group 3, Nit acid.

Sodium silicate solution (43) is not compa ble with Group 3, Nitric Acid.

Sodium sulfide, hydrosulfide solution (0) not compatible with Groups 6 (Amm nia) and 7 (Aliphatic amines).

Sodium thiocyanate (56% or less) (0) is n compatible with Groups 1-4.

Sulfuric acid (2) is not compatible with Fi oil (34), or Oleum (0).

Tallow fatty acid (34) is not compatible wi Group 5, Caustics.

1,1,1-Trichloroethane (36) is not compati with Oleum (0).

Trichloroethylene (36) is not compati with Group 5, Caustics.

Triethyl phosphite (34) is not compati with Groups 1, and 4.

Trimethyl phosphite (34) is not compati with Groups 1 and 4.

[CGD 88-100, 54 FR 40012, Sept. 29, 19 amended by CGD 88-100, 55 FR 17277, A 24, 1990]

APPENDIX II—EXPLANATION OF FIGU 1

Definition of a hazardous reaction—A first approximation, a mixture of two c goes is considered hazardous when, un specified condition, the temperature ri the mixture exceeds 25°C or a gas is evol It is possible for the reaction of two car to produce a product that is significa more flammable or toxic than the orig cargoes even though the reaction is n hazardous from temperature or press considerations, although no examples such a reaction are known at this time.

Chart format—There are different degr of reactivity among the various carg Many of them are relatively non-reacti For example, aromatic hydrocarbons or p affins. Others will form hazardous combi tions with many groups: For example, th inorganic acids.

The cargo groups in the compatibil chart are separated into two categories through 22 are "Reactive Groups" and through 43 are "Cargo Groups". Left un signed and available for future expan are groups 23 through 29 and those pa Reactive Groups contain products which chemically the most reactive; danger combinations may result between memb of different Reactive Groups and betw members of Reactive Groups and Ca Groups. Products assigned to Cargo Gro however, are much less reactive; dange combinations involving these can be formed only with members of certain Reactive Groups. Cargo Groups do not react hazardously with one another.

Using the Compatibility Chart—The following procedure explains how the compatibility chart should be used to find compatibility infomation:

(1) Determine the group numbers of the two cargoes by referring to the alphabetical listing of cargoes and the corresponding groups (Table I). Many cargoes are listed under their parent names; unless otherwise indicated, isomers or mixtures of isomers of a particular cargo are assigned to the same group. For example, to find the group number for Isobutyl Alcohol, look under the parent name Butyl Alcohol. Similarly, the group number for para-Xylene is found under the entry Xylene. If a cargo cannot be found in this listing, contact the Coast Guard for a group determination (see § 150.140).

(2) If both group numbers are between 30 and 43 inclusive, the products are compatible and the chart need not be used.

(3) If both group numbers do not fall between 30 and 43 inclusive, locate one of the numbers on the left of the chart (Cargo Groups) and the other across the top (Reactive Groups). (Note that if a group number is between 30 and 43, it can only be found on the left side of the chart.) The box formed by the intersection of the column and row containing the two numbers will contain one of the following:

(a) Blank—The two cargoes are compatible.

(b) "X"—The two cargoes are not compatible.

(Note that reactivity may vary among the group members. Refer to Table I or Table II to find whether the products in question are referenced by a footnote which indicates that exceptions exist and are listed in Appendix I. Unless the combination is specifically mentioned in Appendix I, it is compatible.)

[CGD 75-59, 45 FR 70263, Oct. 23, 1980, as amended by CGD 83-047, 50 FR 33046, Aug. 16, 1985]

EXAMPLES

Combination	Groups	Compatible
Butyraldehyde/Acetic Acid	19/4	Yes.
Allyl Alcohol/Toluene Diisocyanate	15/12	No.
Decane/Ethyl Benzene	30/32	Yes.
Ethanolamine/Acetone	8/18	Yes.
Ammonia/Dimethylformamide	6/10	No.

APPENDIX III—TESTING PROCEDURES FOR DETERMINING EXCEPTIONS TO THE CHART

EXPERIMENTAL PROCEDURE FOR EVALUATING BINARY CHEMICAL REACTIVITY

General safety precautions—Chemical reactivity tests have, by their nature, serious potential for injuring the experimenter or destroying equipment. The experimenter should 1) have knowledge of the magnitude of the reactivity to be expected, 2) use adequate facilities and protective equipment to prevent injury from splatter of materials or release of fumes, and 3) start on a small scale so that unexpected reactions can be safely contained. All tests should be performed in a well-ventilated laboratory hood provided with shields.

Testing chemicals other than liquids—The procedure outlined below was developed for chemicals which are liquids at ambient temperatures. If one or both chemicals are normally shipped at elevated temperatures, the same procedure may be followed except the chemicals are tested at their respective shipping temperatures and the oil bath in Step 3 is maintained at a level 25°C above the higher temperature. This information is then indicated on the data sheet. If one of the chemicals is a gas at ambient temperatures, consult the Coast Guard for additional instructions before proceeding with the compatibility test.

Step 1

Objective—To determine if the test chemicals react violently and present a safety hazard in further tests.

Procedure—Place 0.5ml of one (A) of the test chemicals in a 25×150mm test tube. Clamp the test tube to a stand behind a safety shield (in a hood). Carefully add from a dropper 0.5ml of the other substance (B). Shake to induce mixing. If no immediate reaction occurs, retain the mixture for at least 10 minutes to check for a delayed reaction.

Results—If a violent reaction occurs, such as sputtering, boiling of reactants or release of fumes, record the results on the Data Sheet (appendix IV) and do not proceed to Step 2. If no reaction or a minor reaction occurs, proceed to Step 2.

Step 2

Objective—To determine the heat of reaction of two chemicals on mixing under specified conditions.

Procedure—These separate mixes of the proposed binary combination will be tested. These are 2 ml : 18 ml, 10 ml : 10 ml, and 18 ml : 2 ml, respectively, to result in a final mixture of about 20 ml in each case.

A reference-junctioned thermocouple is prepared by inserting two lengths of 20 gauge or finer iron-constantan or chromelalumel duplex thermocouple wire into glass capilary sheaths. The common wire of each probe is joined, while the other wire of each is connected to a strip-chart recorder. The thermocouple probe which produces a negative pen deflection upon warming is the reference junction and is placed in a test tube of water at ambient laboratory temprature. The other probe is placed near the bottom of a Dewar flask of about 300ml capacity, such that the thermocouple will be below the surface of the test mixture. The Dewar flask is equipped with a magnetic stirrer having a stirring bar coated with an inert material such as a flourinated hydrocarbon.

Start the temperature recorder and stirrer. Deliver the test chemicals to the Dewar Flask simultaneously from separate graduated syringes. If an exothermic reaction occurs, continue the test until the maximum temperature is reached and begins to subside. If no apparent reaction occurs, continue the test for at least 30 minutes to check for a delayed reaction. Stop agitation and observe the mixture at five-minute intervals to determine if the mixture is miscible, if gases are evolved, or if other visible changes occur. In the interest of safety, a mirror can be used for these observations. Repeat the above test for the other mixture combinations.

Results—Record the results in the appropriate places on the Data Sheet. If no reaction occurs or if the temperature rise is less than 25°C, proceed to Step 3. If the observed temperature rise exceeds 25°C or gases are evolved, do not proceed to Step 3.

Step 3

Objective—To determine if exothermic reactions occur at temperatures up to 50°C.

Procedure—If a non-hazardous reaction occurred in Step 2, the ratio of chemicals which resulted in the greatest temperature rise will be tested. Fresh chemicals will be used with a total volume for this test of about 10ml (a ratio of 1ml:9ml, 5ml:5ml, or 9ml:1ml). If no reaction was observed in Step 2, use a ratio of 5ml:5ml. Using the thermocouple prepared for Step 2, insert the reference probe into a 25×150mm test tube containing 10ml of water. Place the other probe into an empty test tube. Start the temperature recorder and add the two chemicals of the combination, one at a time to the empty test tube. Lower the two test tubes into an oil bath maintained at 50 ± 2°C. Hold the samples in the oil bath until the maximum temperature differential is recorded, and in all cases at least 15 minutes. Observe the test mixture to determine if gases are evolved or if other visible changes occur. Follow prescribed safety precautions.

Results—Record the maximum differential temperature measured, the time required to reach this temperature, and any other observations in the proper space on the Data Sheet.

Send a copy of the Data Sheet for each binary chemical mixture tested to: Commandant (G-MTH), U.S. Coast Guard, Washington, DC 20593-0001.

[CGD 75-59, 45 FR 70263, Oct. 23, 1980, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 83-047, 50 FR 33046, Aug. 1985; CGD 88-070, 53 FR 34535, Sept. 1988]

Appendix IV - Data sheet

CHEMICAL REACTIVITY TEST DATA

Chemicals: A____________________ B____________________

Synonyms: ____________________ ____________________

Formula: ____________________ ____________________

Description of Products:	A	B
Manufacturer		
Sample Source		
Composition (by weight %)		
Inhibitors or Stabilizers		

Deviations from Prescribed Method (including special equipment)	

Step Number 1

Products miscible? ____________________ Gases evolved? ____________________

Other Observations:

Step Number 2

A/B Ratio:	2/18	10/10	18/2
Initial Temperature			
Maximum ΔT			
Time to reach Max. Temp.			
Products miscible?			
Gases evolved?			
Other Observations			

Size of Dewar Flask (inside measurements): Width ________mm Height ________mm

Step Number 3

A/B Ratio	
Oil Bath Temperature	
Maximum ΔT	
Time to reach Max. Temp.	
Gases evolved?	
Other Observations	

Date of Test: ____________________

Submitting Organization: ____________________

Test Data Approved By: ____________________

PART 151—BARGES CARRYING BULK LIQUID HAZARDOUS MATERIAL CARGOES

Subpart 151.01—General

Sec.
151.01-1 Applicability.
151.01-2 Incorporation by reference.
151.01-3 [Reserved]
151.01-5 [Reserved]
151.01-10 Application of vessel inspection regulations.
151.01-15 Dangerous cargoes not specifically named.
151.01-20 Use of minimum requirements.
151.01-25 Existing barges.
151.01-30 Effective date.
151.01-35 Right of appeal.

Subpart 151.02—Equivalents

151.02-1 Conditions under which equivalents may be used.
151.02-5 Design of unmanned barges.

Subpart 151.03—Definitions

151.03-1 Definitions of terms.
151.03-3 Angle of downflooding.
151.03-5 Approved.
151.03-7 Barge.
151.03-9 Cargo.
151.03-11 Coastwise.
151.03-13 Cofferdam.
151.03-15 Commandant.
151.03-17 Compatible.
151.03-19 Environment.
151.03-21 Filling density.
151.03-23 Flame arrestor.
151.03-25 Flame screen.
151.03-27 Gas free.
151.03-29 Great Lakes.
151.03-30 Hazardous material.
151.03-31 Headquarters.
151.03-33 Lakes, bays, and sounds.
151.03-35 Limiting draft.
151.03-36 Liquid.
151.03-37 Maximum allowable working pressure.
151.03-38 Nondestructive testing.
151.03-39 Ocean.
151.03-41 Officer in Charge, Marine Inspection.
151.03-43 Pressure.
151.03-45 Rivers.
151.03-47 Service.
151.03-49 Sounding tube.
151.03-51 Tank barge.
151.03-53 Tankerman.
151.03-55 [Reserved]

Sec.

Subpart 151.04—Inspection and Certification

151.04-1 Certificate of inspection.
151.04-2 Inspection required.
151.04-3 Initial inspection.
151.04-5 Inspection for certification.
151.04-7 Nondestructive testing.

Subpart 151.05—Summary of Minimum Requirements for Specific Cargoes

151.05-1 Explanation of column headings in Table 151.05.
TABLE 151.05

Subpart 151.10—Barge Hull Construction Requirements

151.10-1 Barge hull classifications.
151.10-15 Certificate endorsement.
151.10-20 Hull construction.

Subpart 151.12—Equipment and Operating Requirements for Control of Pollution From Category D NLS Cargoes

151.12-5 Equipment for Category D NLS.
151.12-10 Operation of oceangoing non-self-propelled ships carrying Category D NLS.

Subpart 151.13—Cargo Segregation

151.13-1 General.
151.13-5 Cargo segregation—tanks.

Subpart 151.15—Tanks

151.15-1 Tank types.
151.15-3 Construction.
151.15-5 Venting.
151.15-6 Venting piping.
151.15-10 Cargo gauging devices.

Subpart 151.20—Cargo Transfer

151.20-1 Piping—general.
151.20-5 Cargo system valving requirements.
151.20-10 Cargo system instrumentation.
151.20-15 Cargo hose if carried on the barge.
151.20-20 Cargo transfer methods.

Subpart 151.25—Environmental Control

151.25-1 Cargo tank.
151.25-2 Cargo handling space.

Subpart 151.30—Portable Fire Extinguishers

151.30-1 Type.

Subpart 151.40—Temperature or Pressure Control Installations

151.40-1 Definitions.

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151.40-2 Materials.
151.40-5 Construction.
151.40-10 Operational requirements.
151.40-11 Refrigeration systems.

Subpart 151.45—Operations

151.45-1 General.
151.45-2 Special operating requirements.
151.45-3 Manning.
151.45-4 Cargo handling.
151.45-5 Open hopper barges.
151.45-6 Maximum amount of cargo.
151.45-7 Shipping papers.
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Subpart 151.50—Special Requirements

151.50-1 General.
151.50-5 Cargoes having toxic properties.
151.50-6 Motor fuel antiknock compounds.
151.50-10 Alkylene oxides.
151.50-12 Ethylene oxide.
151.50-13 Propylene oxide.
151.50-20 Inorganic acids.
151.50-21 Sulfuric acid.
151.50-22 Hydrochloric acid.
151.50-23 Phosphoric acid.
151.50-30 Compressed gases.
151.50-31 Chlorine.
151.50-32 Ammonia, anhydrous.
151.50-34 Vinyl chloride (vinyl chloride monomer).
151.50-36 Argon or nitrogen.
151.50-40 Additional requirements for carbon disulfide (carbon bisulfide) and ethyl ether.
151.50-41 Carbon disulfide (carbon bisulfide).
151.50-42 Ethyl ether.
151.50-50 Elemental phosphorus in water.
151.50-55 Sulfur (molten).
151.50-60 Benzene.
151.50-70 Cargoes requiring inhibition or stabilization.
151.50-73 Chemical protective clothing.
151.50-74 Ethylidene norbornene.
151.50-75 Ferric chloride solution.
151.50-76 Hydrochloric acid, spent (NTE 15%).
151.50-77 Hydrofluorosilicic acid (25% or less).
151.50-79 Methyl acetylene-propadiene mixture.
151.50-80 Nitric acid (70% or less).
151.50-81 Special operating requirements for heat sensitive cargoes.
151.50-84 Sulfur dioxide.
151.50-86 Octyl nitrates.

Subpart 151.55—Special Requirements for Materials of Construction

151.55-1 General.

Subpart 151.56—Prohibited Materials of Construction

Sec.
151.56-1 Prohibited materials.

Subpart 151.58—Required Materials of Construction

151.58-1 Required materials.

AUTHORITY: 33 U.S.C. 1903(b), 46 U.S.C. 3703; 49 CFR 1.46.

SOURCE: CGFR 70-10, 35 FR 3714, Feb. 2 1970, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes for part 151 appear at CGD 88-100, 54 FR 40029, Sept. 29, 1989.

Subpart 151.01—General

§ 151.01-1 Applicability.

This part applies to the following:

(a) Oceangoing, as defined in 33 CFR 151.05(j), non-self-propelled United States ships and non-self-propelled foreign ships operating in United States waters that carry a bulk cargo that is—

(1) Listed in Table 151.05;

(2) Not being carried in a portable tank regulated under subpart 98.30 or 98.33 of this chapter; and

(3) Not an NLS or is an NLS cargo that is a Category D listed in § 151.12-5 of this part.

(b) All non-self-propelled United States ships that are not oceangoing that carry a bulk cargo that is—

(1) Listed in Table 151.05, and

(2) Not being carried in a portable tank regulated under subpart 98.30 or 98.33 of this chapter.

[CGD 81-101, 52 FR 7776, Mar. 12, 1987, as amended by CGD 84-043, 55 FR 37413, Sept. 11, 1990]

§ 151.01-2 Incorporation by reference.

(a) Certain standards and specifications are incorporated by reference into this part with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a). To enforce any edition other than the ones listed in paragraph (b) of this section, notice of change must be published in the FEDERAL REGISTER and the material made available to the public. All approved material is on file at the Office of the Federal Register, 1100 L Street

NW., Washington, DC, and is available from the sources indicated in paragraph (b) of this section.

(b) The standards and specifications approved for incorporation by reference in this part and the sections affected, are:

American Society for Nondestructive Testing (ASNT)

4153 Arlingate Road, Caller #28518, Columbus, OH 43228-0518

ASNT "Recommended Practice No. SNT-TC-1A (1988), Personnel Qualification and Certification in Nondestructive Testing"	151.04-7(c)(2)

American Society of Mechanical Engineers

United Engineering Center, 345 East 47th Street, New York, NY 10017

ASME Boiler and Pressure Vessel Code Section V, Nondestructive Examination (1986)	151.04-7(a)(1)

[CGD 85-061, 54 FR 50965, Dec. 11, 1989]

§ 151.01-3 [Reserved]

§ 151.01-5 [Reserved]

§ 151.01-10 Application of vessel inspection regulations.

(a) The regulations in this part are requirements which may be in addition to, supplement, or modify requirements in other subchapters in this chapter. When a specific requirement in another part or section in another subchapter in this chapter is in conflict with or contrary to requirement or intent expressed in this part, the regulations in this part shall take precedence.

(b) Every unmanned tank barge which carries or is intended to carry in bulk any liquid or liquefied gas listed in Table 151.05 and has flammability or combustibility characteristics as indicated by a fire protection requirement in Table 151.05 shall be inspected and certificated under the provisions in subchapter D (Tank Vessels) of this chapter and the regulations in this part.

(c) Every unmanned tank barge prior to the carriage in bulk of any liquid or liquefied gas listed in Table 151.05 which does not have the flammability or combustibility characteristics as indicated by the fire protection requirement in Table 151.05 shall be inspected and certificated under the applicable provisions of subchapter D or subchapter I of this chapter, at the option of the barge owner, in addition to the regulations in this part. However, unless the barge owner notifies the Officer in Charge, Marine Inspection of his option to have the barge inspected and certificated under subchapter I at the time he submits the application for inspection (Form CG-3752), the unmanned tank barge shall be inspected and certificated under the provisions of subchapter D of this chapter and the regulations in this part.

(c-1) Each unmanned tank barge constructed on or after September 6, 1977, that carries in bulk a cargo listed in Table 151.05 and that is certificated under subchapter I of this chapter must meet the loading information requirements in § 31.10-32 of this chapter.

(d) The provisions of subchapter D of this chapter shall apply to all unmanned tank barges which carry in bulk any of the liquids or liquefied gases listed in Table 30.25-1 of this chapter. The provisions of this part shall not apply to such barges unless it is also desired to carry one or more of the liquids or liquefied gases listed in Table 151.05.

(e) Manned barges which carry or intend to carry in bulk the cargoes specified in Table 151.05 will be considered individually by the Commandant and may be required to meet the requirements of this subchapter and of Subchapter D (Tank Vessels) or I (Cargo and Miscellaneous Vessels) of this chapter as applicable.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970]

EDITORIAL NOTE: For Federal Register citations affecting § 151.01-10, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 151.01-15 Dangerous cargoes not specifically named.

(a) Any liquid or liquefied gas, which meets the definitions referred to in § 151.01-1 and is not named in Table 151.05 or Table 30.25-1 of this chapter shall not be transported in bulk in a manned or unmanned tank barge without the prior specific approval of the Commandant.

(b) Mixtures or blends of two or more cargoes, one or more of which appears in Table 151.05, will be treated as though they were new products and specific approval of the Commandant must be obtained prior to undertaking their transportation.

[CGFR-70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 81-101, 52 FR 7777, Mar. 12, 1987; CGD 81-101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989; CGD 88-100, 54 FR 40029, Sept. 29, 1989]

§ 151.01-20 Use of minimum requirements.

(a) The minimum requirements governing transportation of any liquid or liquefied gas listed in Table 151.05 are set forth in this part when such substances are carried in bulk in unmanned tank barges.

(b) Before any liquid or liquefied gas listed in Table 151.05 may be carried in an unmanned tank barge, the certificate of inspection issued to such barge shall be appropriately endorsed to show approval to transport such cargo.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40029, Sept. 29, 1989]

§ 151.01-25 Existing barges.

(a) Except as provided in paragraph (c) of this section, barges certified for, or used within the previous 2 years prior to the effective date of this regulation, or barges equivalent to such barges, for the transportation of any cargo regulated by this subchapter which do not meet the specific requirements herein, may be continued in service subject to the following conditions:

(1) Venting, gauging, and all operating requirements shall be met within a 1-year period subsequent to the effective date.

(2) All other requirements shall be met within a 2-year period subsequent to the effective date.

(b) If an existing barge, which has been designed to carry or has regularly been carrying one or more of the cargoes regulated by this subchapter, is found to be so arranged, or outfitted that conversion to bring it into compliance with any or all of the requirements of this subchapter is impractical or impossible, the Commandant, upon application, may review the plans of the barge to determine if it is suitable and safe for the cargoes to be transported.

(c) Except for operating and vinyl chloride requirements, barges constructed and certificated for the transportation of any cargo for which specific regulations existed, in parts 3 38, 39, 40, and 98 of this chapter at the time of their construction or conversion, may continue and will be certificated to operate without the requirement that they comply with the provisions of subchapter O of this chapter.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 74-167k, 40 FR 170 Apr. 16, 1975]

§ 151.01-30 Effective date.

(a) The regulations in this subchapter are effective on and after June 1 1970. However, amendments, revisions or additions shall become effective ninety (90) days after the date of publication in the FEDERAL REGISTER unless the Commandant shall fix a different time.

(b) The regulations in this subchapter are not retroactive in effect unless specifically made so at the time the regulations are issued. Changes in specification requirements of articles of equipment, or materials used in construction of tank barges, shall not apply to such items which have been passed as satisfactory until replacement shall become necessary, unless a specific finding is made that such equipment or materials used is unsafe or hazardous and has to be removed from tank barges.

§ 151.01-35 Right of appeal.

Any person directly affected by a decision or action taken under this part by or on behalf of the Coast Guard may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989]

Subpart 151.02—Equivalents

§ 151.02-1 Conditions under which equivalents may be used.

(a) Where in this part it is provided that a particular fitting, material, or pliance, apparatus, or equipment, or type thereof, shall be fitted or carried in a vessel, or that any particular provision shall be made or arrangement including cargo segregation shall be adopted, the Commandant may accept in substitution therefor any other fitting, material, apparatus or equipment, or type thereof, or any other provision or arrangement. However, the Commandant shall be satisfied by suitable evidence that the fitting, material, appliance, apparatus, or equipment, or the type thereof, or the provision or arrangement shall be at least as effective as that specified in this part.

(b) In any case where it is shown to the satisfaction of the Commandant that the use of any particular equipment, apparatus, or arrangement not specifically required by law is unreasonable or impracticable, the Commandant may permit the use of alternate equipment apparatus, or arrangement to such an extent and upon such conditions as will insure, to his satisfaction, a degree of safety consistent with the minimum standards set forth in this part.

§ 151.02-5 Design of unmanned barges.

(a) In order not to inhibit design and application, the Commandant may approve vessels of novel design, both new and for conversion, after it is shown to his satisfaction that such a vessel is at least as safe as any vessel which meets the standards required by this part.

Subpart 151.03—Definitions

§ 151.03-1 Definitions of terms.

Certain terms used in the regulations in this subchapter are defined in this subpart.

§ 151.03-3 Angle of downflooding.

The angle of heel of the vessel at which any opening in the hull not provided with a water tight closure would be immersed.

§ 151.03-5 Approved.

This term means approved by the Commandant unless otherwise stated.

§ 151.03-7 Barge.

This term means any non-self-propelled vessel designed to carry cargo.

§ 151.03-9 Cargo.

This term means any liquid, gas or solid having one or more of the dangerous properties defined in this subchapter.

§ 151.03-11 Coastwise.

This designation refers to all vessels normally navigating the waters of any ocean or the Gulf of Mexico 20 nautical miles or less offshore.

§ 151.03-13 Cofferdam.

This term means a void or empty space separating two or more compartments for the purpose of isolation or to prevent the contents of one compartment from entering another in the event of the failure of the walls of one to retain their tightness.

§ 151.03-15 Commandant.

This term means Commandant of the U.S. Coast Guard.

§ 151.03-17 Compatible.

Compatible means that a cargo will not react in an unsafe manner with other cargo or materials used in construction of the barge. The prime considerations are the chemical, physical, or thermal properties of the reaction including heat, pressure, toxicity, stability, and explosive nature of the reaction and its end products.

§ 151.03-19 Environment.

This term refers to the atmosphere within a cargo tank and the spaces adjacent to the tank or spaces in which cargo is handled.

§ 151.03-21 Filling density.

The ratio, expressed as a percentage, of the weight of cargo that may be loaded into a tank compared to the weight of water that the tank will hold at 60° F. The weight of a gallon of water at 60° F. in air shall be 8.32828 pounds.

§ 151.03-23 Flame arrestor.

Any device or assembly of cellular, tubular, pressure or other type used for preventing the passage of flames into enclosed spaces.

§ 151.03-25 Flame screen.

A fitted single screen of corrosion-resistant wire of at least 30 by 30 mesh or two fitted screens, both of corrosion-resistant wire, of at least 20 by 20 mesh spaced not less than one-half inch or more than 1½ inches apart.

§ 151.03-27 Gas free.

Free from dangerous concentrations of flammable or toxic gases.

§ 151.03-29 Great Lakes.

A designation for all vessels in Great Lakes service.

§ 151.03-30 Hazardous material.

In this part "hazardous material" means a liquid material or substance that is—

(a) Flammable or combustible;

(b) Designated a hazardous substance under section 311(b) of the Federal Water Pollution Control Act (33 U.S.C. 1321); or

(c) Designated a hazardous material under section 104 of the Hazardous Material Transportation Act (HMTA) (49 U.S.C. 1803).

NOTE: The Environmental Protection Agency designates hazardous substances in 40 CFR Table 116.4A. The Coast Guard designates hazardous materials that are transported as bulk liquids by water in § 153.40.

[CGD 81-101, 52 FR 7777, Mar. 12, 1987]

§ 151.03-31 Headquarters.

The Office of the Commandant, U.S. Coast Guard, Washington, DC 20593-0001.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-070, 53 FR 34535, Sept. 7, 1988]

§ 151.03-33 Lakes, bays, and sounds.

A designation for all vessels navigating the waters of any of the lakes, bays, or sounds other than the waters of the Great Lakes.

§ 151.03-35 Limiting draft.

Maximum allowable draft to which barge may be loaded. Limiting draft a function of hull type and cargo sp cific gravity. A barge may be assigne different limiting drafts for differe hull types or within one hull type f different specific gravities.

§ 151.03-36 Liquid.

In this part "liquid" includes liqu fied and compressed gases.

[CGD 81-101, 52 FR 7777, Mar. 12, 1987]

§ 151.03-37 Maximum allowable workin pressure.

The maximum allowable workin pressure shall be as defined in sectio VIII of the ASME Boiler and Pressu Vessel Code.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, amended by CGD 85-061, 54 FR 50965, De 11, 1989]

§ 151.03-38 Nondestructive testing.

Nondestructive testing includes u trasonic examination, liquid penetra examination, magnetic particle exam nation, radiographic examinatio eddy current, and acoustic emission.

[CGD 85-061, 54 FR 50965, Dec. 11, 1989]

§ 151.03-39 Ocean.

A designation for all vessels norma ly navigating the waters of any oce or the Gulf of Mexico more than nautical miles offshore.

§ 151.03-41 Officer in Charge, Marine I spection.

Any person from the civilian or mil tary branch of the Coast Guard desi nated as such by the Commanda and who, under the superintenden and direction of the Coast Guard Di trict Commander, is in charge of an i spection zone for the performance duties with respect to the enforceme and administration of title 52 R.S. acts amendatory thereof or supple mental thereto, and rules and regul tions thereunder.

§ 151.03-43 Pressure.

Terminology used in this part a pounds per square inch gauge (p.s.i.g or pounds per square inch absolu (p.s.i.a.). 14.7 p.s.i.a. is equal to p.s.i.g. P.s.i.g. is normally used in refe ence to design or operating requirements.

§ 151.03-45 Rivers.

A designation for all vessels whose navigation is restricted to rivers and/or canals, exclusively.

§ 151.03-47 Service.

The waters upon which a vessel may be operated as endorsed upon the certificate of inspection.

§ 151.03-49 Sounding tube.

This is an unperforated tube fitted to an ullage hole, secured so as to be vapor tight to the underside of the tank top open at the bottom, and extending to within 18 inches or less of the bottom of the tank.

§ 151.03-51 Tank barge.

A non-self-propelled vessel especially constructed or converted to carry bulk liquid cargo in tanks.

§ 151.03-53 Tankerman.

A tankerman is a person holding a certificate issued by the Coast Guard attesting to his or her competency in handling flammable or combustible liquid cargo in bulk or any person holding a valid license as master or mate of inspected, mechanically propelled vessels of more than 200 gross tons; pilot of inspected, mechanically propelled vessels; or engineer.

[CGD 81-059, 54 FR 151, Jan. 4, 1989]

§ 151.03-55 [Reserved]

Subpart 151.04—Inspection and Certification

§ 151.04-1 Certificate of inspection.

(a) A certificate of inspection is required for every unmanned tank barge subject to the requirements in this subchapter. A certificate of inspection shall be issued to the barge or to its owners by the Officer in Charge, Marine Inspection, if the barge is found to comply with applicable inspection laws and the regulations in this chapter.

(b) The certificate of inspection shall be endorsed with respect to the waters over which the barge may be operated.

(c) The certificate shall be endorsed describing the cargoes by name as given in Table 151.05 or as specifically approved by the Commandant. No other dangerous cargo as defined in Subpart 151.01-1 shall be carried. Certificates shall specify maximum cargo weight (short tons), maximum density (pounds per gallon) and any operating limitations and a limiting draft.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40029, Sept. 29, 1989]

§ 151.04-2 Inspection required.

(a) Every unmanned tank barge subject to the regulations in this subchapter shall be inspected biennially. More frequent inspections may be required, if necessary, by the Officer in Charge, Marine Inspection, to see that the hull, equipment and appliances of the vessel comply with the marine inspection laws, and the regulations of this subchapter and other subchapters where applicable.

§ 151.04-3 Initial inspection.

(a) The initial inspection which may consist of a series of inspections during the construction of an unmanned barge shall include a complete inspection of the structure, auxiliary machinery, and equipment. The inspection shall be such as to insure that the arrangement, materials, and scantlings of the hull structure, tanks and pressure vessels and their appurtenances comply with applicable regulations of this chapter and with the requirements of this part.

§ 151.04-5 Inspection for certification.

(a) An inspection for certification is a prerequisite of the reissuance of a Certificate of Inspection as provided for in applicable regulations of this chapter.

(b) Unless otherwise specified in table 151.05, cargo tanks are internally examined as follows:

(1) Where the cargo tank is of the gravity type and the structural framing is on the internal tank surface, the tank shall be inspected internally at the time of inspection for certification.

(2) Where the cargo tank is of the gravity type and the structural framing is on the external tank surface accessible for examination from voids, cofferdams, double bottoms, and other similar spaces, tanks shall be inspected internally at 4-year intervals.

(3) If the tank is a pressure-vessel type cargo tank, an internal inspection of the tank is conducted within—

(i) Ten years after the last internal inspection on an unmanned barge carrying cargo at temperatures of −67 °F (−55 °C) or warmer; or

(ii) Eight years after the last internal inspection if the tank is a pressure type cargo tank carrying cargo at temperatures colder than −67 °F (−55 °C).

(4) Internal inspection may be required at more frequent intervals as deemed necessary by the Officer in Charge, Marine Inspection.

(c) An external examination of unlagged tanks and the visible parts of lagged tanks is made at each biennial inspection. If the vessel has single skin construction, the underwater portion of the tank need not be examined unless deemed necessary by the Officer in Charge, Marine Inspection. If an external examination of the tank is not possible because of insulation, the owner shall ensure that—

(1) The amount of insulation deemed necessary by the marine inspector is removed during each cargo tank internal inspection to allow spot external examination of the tanks and insulation; or

(2) The thickness of the tanks is gauged by a nondestructive means accepted by the marine inspector without the removal of insulation.

(d) If required by the Officer in Charge, Marine Inspection the owner shall conduct nondestructive testing of each tank designated by the Officer in Charge, Marine Inspection in accordance with § 151.04-7.

(e) If the Officer in Charge, Marine Inspection considers a hydrostatic test necessary to determine the condition of the tanks, the owner shall perform the test at a pressure of 1½ times the tank's—

(1) Maximum allowable pressure, as determined by the safety relief valve setting; or

(2) Design pressure, when cargo tanks operate at maximum allowable pressures reduced below the design pressure in order to satisfy special mechanical stress relief requirements.

NOTE: See the ASME Code, Section VIII Appendix 3 for information on design pressure.

(f) Quick closing valves shall be tested by operating the emergency shutoff system from each operating point at the time of each vessel's inspection for certification.

(g) Excess flow valves shall be inspected at the time of inspection for certification. The Officer in Charge, Marine Inspection, shall satisfy himself that the valve is in working condition by visual inspection, and if this is impossible, by one of the following means:

(1) Removing the valve and bench testing ashore; the valve shall close at or below its rated closing flow.

(2) By any other means acceptable to the Officer in Charge, Marine Inspection, which will demonstrate that the valve is operable.

(h) Pressure vaccum relief valves shall be examined to determine that the operating mechanism is free and capable of activation.

(i) Safety relief valves shall be tested by bench testing or other suitable means. The valves shall relieve and reseat within the design tolerances of the set pressure, or it shall be removed and reset prior to being returned to service. This test shall be conducted at the time of the inspection for certification.

(j) [illegible] hose stored on board the vessel which is used in transferring cargoes listed in Table 151.05 shall be inspected every 2 years. This inspection shall consist of a visual examination and a hydrostatic test of 1½ times the maximum pressure to which the hose will be subjected in service. The date of the most recent inspection and the test pressure shall be stenciled or otherwise marked on the hose.

(k) Cargo piping shall be inspected and tested at the same time as the cargo tanks.

(l) If the tank is a pressure vessel type cargo tank with an internal inspection interval of 10 years, and is years old or older, determined from the date it was built, the owner shall conduct nondestructive testing of each tank in accordance with § 151.04-7, during each internal inspection.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40029, Sept. 29, 1989; CGD 85-061, 54 FR 50965, Dec. 11, 1989]

§ 151.04-7 Nondestructive testing.

(a) Before nondestructive testing may be conducted to meet § 151.04-5 (d) and (l), the owner shall submit a proposal to the Officer in Charge, Marine Inspection that includes—

(1) The test methods and procedures to be used all of which must meet section V of the ASME Boiler and Pressure Vessel Code (1986);

(2) Each location on the tank to be tested; and

(3) The test method and procedure to be conducted at each location on the tank.

(b) If the Officer in Charge, Marine Inspection rejects the proposal, the Officer in Charge, Marine Inspection informs the owner of the reasons why the proposal is rejected.

(c) If the Officer in Charge, Marine Inspection accepts the proposal, then the owner shall ensure that—

(1) The proposal is followed; and

(2) Nondestructive testing is performed by personnel meeting ASNT "Recommended Practice No. SNT-TC-1A (1988), Personnel Qualification and Certification in Nondestructive Testing."

(d) Within 30 days after completing the nondestructive test, the owner shall submit a written report of the results to the Officer in Charge, Marine Inspection.

[CGD 85-061, 54 FR 50966, Dec. 11, 1989]

Subpart 151.05—Summary of Minimum Requirements for Specific Cargoes

§ 151.05-1 Explanation of column headings in Table 151.05.

(a) *Cargo identification/name.* This column identifies cargoes by name. Words in italics are not part of the cargo name but may be used in addition to the cargo name. When one entry references another entry by use of the word "see" and both names are in roman type, either name may be used as the cargo name (e.g., "Diethyl either *see* Ethyl ether"). However, the referenced entry is preferred.

(b) *Cargo identification/pressure.* This column identifies cargo in terms of pressure within the tank. Terms used are:

(1) *Pressurized.* Cargo carried at a pressure in excess of 10 pounds per square inch gauge as measured at the top of the tank (i.e., exclusive of static head).

(2) *Atmospheric pressure.* Cargo carried at not more than 10 pounds per square inch gauge, exclusive of static head.

(c) *Cargo identification/temperature.* This column identifies the cargo by the temperature of the cargo during transit.

(1) *Ambient temperature.* Cargo which is carried at naturally occurring temperatures.

(2) *Low temperature.* Cargo carried below ambient temperatures when the product temperature is below 0°F.

(3) *Elevated temperature.* Cargo carried above ambient temperatures.

(d) *Hull type.* This column refers to the flotation features of the barge. Terms used are explained and defined in Subpart 151.10 of this part.

(e) *Cargo segregation/tanks.* This column refers to the separation of the cargo from its surroundings. Terms are explained in § 151.13-5 and in footnotes to Table 151.05 of this part.

(f) *Cargo segregation/piping and venting.* This column indicates the required separation of piping and venting used for the cargo from piping and venting used for other cargo. Terms are explained in § 151.13-10 and in the footnotes of Table 151.05.

(g) *Tanks/type.* This column refers to the design requirements for cargo tanks and their placement within the hull of the vessel. Terms are explained in § 151.15-1.

(h) *Tanks/venting.* This column refers to arrangements for preventing excess pressure or vacuum within the cargo tank. Terms used are explained and defined in § 151.15-5.

(i) *Tanks/gauging devices.* This column refers to arrangements provided for determining the amount of cargo present in cargo tanks. Terms used are explained and defined in § 151.15-10.

(j) *Cargo transfer/piping.* This column refers to the classification of piping in accordance with Subchapter F of this chapter as discussed in § 151.20-1.

(k) *Cargo transfer/control.* This column refers to the valving requirements for the cargo piping system. These requirements are defined in § 151.20-5.

(l) *Environmental control/cargo tanks.* This column refers to control of the composition of the environment within cargo tanks. Definitions and detailed requirements are given in § 151.25-1.

(m) *Environmental control/cargo handling space.* This column refers to control of the environment in the cargo handling spaces. Definitions and detailed requirements are found in § 151.25-2.

(n) *Fire protection.* This column specifies whether portable fire extinguishers are required on barges carrying the cargo named. Requirements for cargoes requiring extinguishers are given in Subpart 151.30 of this part.

(o) *Special requirements.* This column refers to requirements in subparts 151.40, 151.50, 151.55, 151.56, and 151.58 of this part which apply to specific cargoes. The section numbers listed omit the preceding part designation, "151".

(p) *Electrical hazard class—group.* This column lists the electrical hazard class and group used for the cargo when determining requirements for electrical equipment under subchapter J (Electrical engineering) of this chapter.

(q) *Temperature control installations.* This column refers to systems which are used to control the temperature of the cargo. Definitions and requirements which are applicable if such systems are used are given in Subpart 151.40 of this part.

(r) *Tank inspection period.* This column refers to the maximum period in years between internal cargo tank inspections. Applicable requirements are given in § 151.04-5.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970; 35 FR 6431, Apr. 22, 1970, as amended by CGD 74-275, 40 FR 21958, May 20, 1975; CGD 88-100, 54 FR 40029, Sept. 29, 1989]

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Acetaldehyde	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR	Restr.	II	P-1	Inerted	Vent F	Yes	.55-1(h)	I-C	NA	G
Acetic acid	Atmos.	Amb.	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(g)	I-D	NA	G
Acetic anhydride	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(g)	I-D	NA	G
Acetone cyanohydrin.	Atmos.	Amb.	I	1ii 2i	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 **.50-70(b)** **.50-73** **.50-81**	NA	NA	G
Acetonitrile	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Acrylic acid	Atmos	Amb	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a) .50-73 **.50-81** .58-1(a)	I-D	NA	G
Acrylonitrile	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(e) **.50-70(a)**	I-D	NA	G
Adiponitrile	Atmos.	Amb.	II	1ii 2i	Integral Gravity	PV	Open	II	G-1	NR	Vent F	Yes	No	NA	NA	G
Allyl alcohol	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 **.50-73**	I-C	NA	G
Allyl chloride	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5	I-D	NA	G
Aluminum sulfate solution.	Atmos	Amb	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.58-1(e)	NA	NA	G
Aminoethylethanolamine.	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(b)	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Ammonia, anhydrous.	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR 250 p.s.i.	Restr.	II	P-2	NR	Vent F	No	.50-30 .50-32	I-D	NA	G
Ammonia, anhydrous.	Atmos.	Low	II	1NA 2ii	Ind. Gravity	PV	Restr.	II-L	G-2	NR	Vent F	No	.50-30 .50-32	I-D	.40-1(b)(1)	8
Ammonium bisulfite solution (70% or less).	Atmos	Amb	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	.50-73 .56-1(a), (b), (c).	NA	NA	G
Ammonium hydroxide (28% or less NH$_3$).	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	**.56-1(a), (b), (c), (f), (g).**	I-D	NA	G
Aniline	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	**.50-5, .50-73**	NA	NA	G
Anthracene oil (Coal tar fraction).	Atmos.	Amb. Elev.	II	1ii .2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	No	I-D	NA	G
Argon, *liquefied*	Press.	Low	III	1NA 2i	Ind. Pressure	SR	Restr.	II-L	P-1	NR	Vent F	No	.40-1(a) .50-30 .50-36.	NA	.40-1(a)	G
Benzene	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent F	Yes	.50-60	I-D	NA	G
Benzene hydrocarbon mixtures (containing Acetylenes) (*having 10% Benzene or more*).	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.56-1(b), (d), (f), (g).**	I-D	NA	G
Benzene hydrocarbon mixtures (*having 10% Benzene or*	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G

Benzene, Toluene, Xylene mixtures (*having 10% Benzene or more*).	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Butadiene	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR	Restr.	II	P-2	NR	Vent F	Yes	**.50-70(a), .50-73.**	I-B	NA	G
Butadiene, Butylene mixtures (*containing Acetylenes*).	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR	Restr.	II	P-1	NR	Vent F	Yes	**.50-30** **.50-70(a), .50-73.** **.56-1(b), (d), (f), (g).**	I-B	NA	G
iso-Butyl acrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent N	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
n-Butyl acrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent N	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Butylamine (all isomers).	Atmos.	Amb.	II	1ii 2ii	Ind. Gravity	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
Butyl methacrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
iso-Butyraldehyde	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent F	Yes	.55-1(h)	I-C	NA	G
n-Butyraldehyde	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent F	Yes	.55-1(h)	I-C	NA	G
Butyraldehydes (crude).	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent F	Yes	No	I-C	NA	G
Camphor oil (*light*)	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	No	I-D	NA	G
Carbolic oil	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 **.50-73**	NA	NA	G
Carbon dioxide, liquid.	Press.	Low	III	1 NA 2i	Ind. Pressure	SR	Restr.	I-L	P-1	NR	Vent F	No	.50-30	NA	.40-1(b)(1)	G
Carbon disulfide	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity	PV	Restr.	II	G-1	Inert	Vent F	Yes	.50-40 .50-41	I-A	NA	G
Carbon tetrachloride	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Open	II	G-1	NR	Vent N	No	No	NA	NA	G
Caustic potash solution.	Atmos.	Amb. Elev.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	NR	No	**.50-73** .55-1(j)	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Caustic soda solution.	Atmos.	Amb. Elev.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	NR	No	**.50-73** .55-1(j)	NA	NA	G
Chlorine	Press.	Amb.	I	1NA 2ii	Ind. Pressure	SR 300 p.s.i.	Indirect	I	P-2	NR	Vent F	No	.50-30 .50-31	NA	NA	3
Chlorobenzene	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent N	Yes	No	I-D	NA	G
Chloroform	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent F	No	No	NA	NA	G
Chlorohydrins (*crude*).	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5	I-D	NA	G
Chlorosulfonic acid	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 **.50-73**	I-B	NA	G
Coal tar naphtha solvent.	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr	II	G-1	NR	**Vent F**	Yes	No	**I-D**	NA	G
Coal tar pitch (molten).	Atmos.	Elev.	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Creosote	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Cresols (all isomers)	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Cresols with less than 5% Phenol see Cresols (all isomers).																
Cresols with 5% or more Phenol see Phenol.																

Cresylate spent caustic.	Atmos.	Amb.	III	1ii 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	50-73 .55-1(b)	NA	NA	G
Cresylic acid, sodium salt solution, *see* Cresylate spent caustic.																
Crotonaldehyde	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(h)	I-C	NA	G
Cyclohexanone	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.56-1(a), (b)	I-D	NA	G
Cyclohexylamine	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.56-1(a), (b), (c), **(g)**.	I-D	NA	G
iso-Decyl acrylate	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	**.50-70(a)** **.50-81(a), (b)** .55-1(c)	NA	NA	G
Dichlorobenzene (all isomers).	Atmos.	Amb.	III	1ii 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.56-1(a), (b)	I-D	NA	G
1,1-Dichloroethane	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Dichlorodifluoromethane.	Press.	Amb.	III	1NA 2i	Ind. Pressure	SR	Restr.	II	P-1	NR	NR	No	No	NA	NA	**G**
2,2'-Dichloroethyl ether.	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(f)	I-D	NA	G
Dichloromethane	Atmos	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	No	NA	NA	G
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution.	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	**No**	.56-1(a), (b), (c), **(g)**.	NA	NA	G
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution.	Atmos.	Amb. Elev	III	1i 2i	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	No	.56-1(a), (b), (c), **(g)**.	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution.	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	**No**	.56-1(a), (b), (c), **(g)**.	NA	NA	G
1,1-, 1,2-, or 1,3-Dichloropropane.	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
1,3-Dichloropropene	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Dichloropropene, Dichloropropane mixtures.	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	**Closed**	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
2,2-Dichloropropionic acid.	Atmos.	Amb.	II	1ii 2i	Integral Gravity	PV	Restr	II	G-1	Dry	**Vent F**	Yes	.50-73 **.56-1(e)**	NA	NA	G
Diethanolamine	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Diethylamine	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
Diethylenetriamine	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Diethyl ether *see* Ethyl ether.																
Diisobutylamine	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
Diisopropanolamine	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Diisopropylamine	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G

N,N-Dimethylacetamide.	Atmos	Amb	III	1ii 2i	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	.56-1(b)	I-D	NA	G
Dimethylamine	Press	Amb.	II	1NA 2ii	Ind. Pressure	SR	Restr	II	P-2	NR	Vent F	Yes	56-1(c)	I-C	NA	G
Dimethylethanolamine	Atmos	Amb.	III	1i 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	56-1(b), (c)	I-C	NA	G
Dimethylformamide	Atmos	Amb	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	.55-1(e)	I-D	NA	G
1,4-Dioxane	Atmos	Amb	II	1ii 2ii	Integral Gravity	PV	Closed	II	G-1	Inerted	Vent F	Yes	No	I-C	NA	G
Diphenylmethane diisocyanate	Atmos	Elev	II	1ii 2i	Integral Gravity	PV	Closed	I	G-1	Inert **Dry**	Vent F	Yes	50-5 **.56-1(a), (b)**	NA	Yes	G
Di-n-propylamine	Atmos	Amb	II	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	55-1(c)	I-C	NA	G
Epichlorohydrin	Atmos	Amb	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	50-5	I-C	NA	G
Ethanolamine	Atmos	Amb	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	55-1(c)	NA	NA	G
Ethyl acrylate	Atmos	Amb	III	1i 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Ethylamine solution (72% or less)	Atmos	Amb	II	1ii 2ii	Integral Gravity	PV	Closed	II	G-1	NR	Vent F	Yes	55-1(b)	I-D	NA	G
N-Ethylbutylamine	Atmos	Amb	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	55-1(b)	I-C	NA	G
Ethyl chloride	Press	Amb	II	1NA 2ii	Ind. Pressure	SR	Restr	II	P-2	NR	Vent F	Yes	No	I-D	NA	8
N-Ethylcyclohexylamine.	Atmos	Amb	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	55-1(b)	I-C	NA	G
Ethylene chlorohydrin	Atmos	Amb	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	50-5 **.50-73.**	I-D	NA	G
Ethylene cyanohydrin	Atmos	Amb	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Ethylenediamine	Atmos	Amb	III	1i 2ii	Integral Gravity	PV	Restr	**II**	G-1	NR	Vent F	Yes	55-1(c)	I-D	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Ethylene dibromide	Atmos.	Amb.	II	1ii 2i	Integral Gravity	PV	Closed	II	G-1	NR	Vent F	No	No	NA	NA	G
Ethylene dichloride	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Ethylene glycol propyl ether.	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Ethylene oxide	Press.	Amb.	I	1NA 2ii	Ind. Pressure	SR	Restr.	II	P-2	Inert	Vent F	Yes	.50-10 .50-12	I-B	.40-1(c)	4
Ethyl ether	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity	PV	Closed	II	G-1	Inert	Vent F	Yes	.50-40 .50-42	I-C	NA	G
2-Ethylhexyl acrylate	Atmos.	Amb	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.50-70(a) .50-81(a), (b)	NA	NA	G
Ethylidene norbornene.	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Closed	II	G-1	NR	Vent F	Yes	.50-5 .50-74	I-C	NA	G
Ethyl methacrylate	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	.50-70(a)	I-D	NA	G
2-Ethyl-3-propylacrolein.	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-C	NA	G
Ferric chloride solutions.	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-75	I-B	NA	G
Formaldehyde solution (37% to 50%).	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	.55-1(h)	I-C	NA	G
Formic acid	Atmos.	Amb.	III	1ii 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(i)	I-D	NA	G
Furfural	Atmos.	Amb.	III	1ii 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(h)	I-C	NA	G

Glutaraldehyde solution (50% or less).	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	No	NA	NA	G
Hexamethylenediamine solution.	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
Hexamethyleneimine	Atmos.	Amb.	II	1ii 2i	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	.56-1(b), (c)	I-C	NA	G
Hydrochloric acid	Atmos.	Amb.	III	1NA 2ii	Ind. Gravity	Open	Open	II	G-1	NR	Vent F	No	.50-20 .50-22 **.50-73**	I-B	NA	4
Hydrochloric acid, spent (15% or less).	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent F	No	.50-75(a) .50-76 **.50-73**	I-B	NA	4
Hydrofluorosilicic acid (25% or less).	Atmos.	Amb.	II	1ii 2ii	Ind. Gravity	PV	Closed	II	G-1	NR	Vent F	No	.50-20 **.50-22** **.50-77**	I-B	NA	4
2-Hydroxyethyl acrylate.	Atmos.	Amb.	I	1ii 2i	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 **.50-70(a)** **.50-73** **.50-81(a), (b)**	NA	NA	G
Isopentaldehyde (mixed isomers) see Valeraldehyde (iso-, n-).																
Isoprene	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Kraft pulping liquors (free alkali content 3% or more) (*including: Black, Green, or White liquor*).	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	NR	No	**.50-73** .56-1(a), (c), (g)	NA	NA	G
Mesityl oxide	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Methylacetylene, Propadiene mixture.	Press.	Amb.	III	1 NA 2ii	Ind. Pressure	SR	Restr.	II	P-2	NR	Vent F	Yes	.50-79	**I-C**	NA	G
Methyl acrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Methylamine (*anhydrous*).	Press	Amb	I	1NA 2ii	Ind. Pressure	SR	Closed	II	P-2	NR	Vent F	Yes	.50-30 .56-1(a), (b), (c).	I-D	NA	8
Methylamine solution (42% or less).	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity	PV	**Closed**	II	G-1	NR	Vent F	Yes	.56-1(a), (b), (c), **(g)**.	I-D	NA	G
Methyl bromide	Press.	Amb.	I	1NA 2ii	Ind. Pressure	SR	Closed	I	P-2	NR	Vent F	Yes	.50-5	I-D	NA	2
Methyl chloride	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR	Restr.	II	P-2	NR	Vent F	Yes	.55-1(c)	I-D	NA	8
Methylcyclopentadiene dimer.	Atmos	Amb	III	1i 2i	Integral Gravity	PV	Restr	II	G-1	NR	**Vent F**	Yes	No	**I-B**	NA	G
Methyl diethanolamine.	Atmos	Amb	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.56-1(b), (c)	**I-C**	NA	G
2-Methyl-5-ethylpyridine.	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(e)	NA	NA	G
Methyl methacrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
2-Methylpyridine	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
alpha-Methylstyrene	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Monochlorodifluoromethane.	Press.	Amb.	III	1NA 2i	Ind. Pressure	SR	Restr.	I	P-1	NR	NR	No	No	NA	NA	**G**
Morpholine	Atmos.	Amb.	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	I-C	NA	G

Motor fuel anti-knock compounds (containing lead alkyls).	Atmos.	Amb.	I	1ii 2ii	Ind. Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-6	I-D	NA	.50-6
Nitric acid (70% or less).	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	.50-20 **.50-73** **.50-80**	I-B	NA	4
Nitrobenzene	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 **.50-73**	I-D	NA	G
Nitrogen, *liquefied*	Press.	Low	III	1NA 2i	Ind. Pressure	SR	Restr	II-L	P-1	NR	Vent F	No	.40-1(a) .50-30 .50-36.,	NA	.40-1(a)	G
1- or 2-Nitropropane	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-81	I-C	NA	G
Octyl nitrates (all isomers).	Atmos.	Amb.	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	**.50-81** .50-86	NA	NA	G
Oleum	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 **.50-73**	I-B	NA	4
Pentachloroethane	Atmos	Amb	III	1ii 2i	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	No	No	NA	NA	G
1,3-Pentadiene	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-70(a)** **.50-81**	I-D	NA	G
Perchloroethylene	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	No	NA	NA	G
Phenol	Atmos.	Amb.	I	1ii 2i	Integral Gravity	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 **.50-73**	NA	NA	2
Phosphoric acid	Atmos.	Amb.	III	1ii 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-23	I-B	NA	4
Phosphorus, elemental.	Atmos.	Elev.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	Water Pad	Vent F	Yes	.50-50	NA	NA	4-8
Phthalic anhydride (molten).	Atmos.	Elev.	III	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	No	NA	NA	G
Polyethylene polyamines.	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(e)	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Polymethylene polyphenyl isocyanate.	Atmos.	Amb.	II	1ii 2i	Integral Gravity	PV	Closed	II	G-1	**Dry**	Vent F	Yes	.55-1(e)	NA	NA	G
Potassium hydroxide solution *see* Caustic potash solution.																
iso-Propanolamine	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	**I-D**	NA	G
Propanolamine (iso-, n-).	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.56-1(b), (c)	I-D	NA	G
Propionic acid	Atmos.	Amb.	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(g)	I-D	NA	G
iso-Propylamine	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
Propylene oxide	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR	Restr.	II	P-1	Inerted	Vent F	Yes	.50-10 .50-13	I-B	NA	**G**
iso-Propyl ether	Atmos.	Amb.	III	**1ii** 2ii	Integral Gravity	PV	Restr	II	G-1	**Inert**	**Vent F**	Yes	**.50-70(a)**	I-D	NA	G
Pyridine	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(e)	I-D	NA	G
Sodium aluminate solution.	Atmos	Amb/ Elev	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	NR	No	.50-73 .56-1(a), (b), (c).	NA	NA	G
Sodium chlorate solution (50% or less).	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	No	NA	NA	G

Sodium dichromate solution (70% or less).	Atmos.	Amb.	II	1ii 2ii	Integral Gravity....	Open	Closed	II	G-1	NR	Vent N	No	.50-5(d) .50-73 .56-1(b), (c)	NA	NA	G
Sodium hydroxide solution *see* Caustic soda solution.																
Sodium hypochlorite solution (15% or less).	Atmos.	Amb.	III	1i 2ii	Integral Gravity....	PV	Restr	II	G-1	NR	Vent F	**No**	.50-73 .56-1(a), (b)	NA	NA	G
Sodium sulfide, hydrosulfide solutions (H_2S 15ppm or less).	Atmos.	Amb.	III	1i 2i	Integral Gravity....	Open	Open	II	G-1	NR	Vent N	No	.50-73 .55-1(b)	NA	NA	G
Sodium sulfide, hydrosulfide solutions (H_2S greater than 15ppm but less than 200ppm).	Atmos.	Amb.	III	1ii 2i	Integral Gravity....	PV	Restr.	II	G-1	NR	Vent F	No	.50-73 .55-1(b)	NA	NA	G
Sodium sulfide, hydrosulfide solutions (H_2S greater than 200ppm).	Atmos.	Amb.	II	1ii 2i	Integral Gravity....	PV	Closed	II	G-1	NR	Vent F	No	.50-73 .55-1(b)	NA	NA	G
Sodium thiocyanate solution (56% or less).	Atmos	Amb	III	1i 2i	Integral Gravity....	Open	Open	II	G-1	NR	Vent N	Yes	**.58 1(a)**	NA	NA	G
Styrene *monomer*	Atmos.	Amb.	III	1i 2ii	Integral Gravity....	Open	Open	II	G-1	NR	Vent N	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Sulfur (molten)	Atmos.	Elev.	III	1i 2ii	Integral Gravity....	Open	Open	II	G-1	Vent N	Vent N	Yes	.50-55	I-C	.40-1(f)(1)	G
Sulfur dioxide	Press.	Amb.	I	1NA 2ii	Ind. Pressure	SR	Closed		P-2	NR	Vent F	No	.50-30 **.50-84** .55-1(j)	NA	NA	2
Sulfuric acid	Atmos.	Amb.	III	1ii 2ii	Integral Gravity....	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 **.50-73**	I-B	NA	4

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Sulfuric acid, spent	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 **.50-73**	I-B	NA	4
1,1,2,2-Tetrachloroethane.	Atmos.	Amb.	III	1ii 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	No	No	NA	NA	G
Tetraethylenepentamine.	Atmos.	Amb.	III	1i 2ii	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Tetrahydrofuran	Atmos	Amb	III	1i 2ii	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	Yes	.50-70(b)	I-C	NA	G
Toluene diisocyanate.	Atmos.	Amb.	I	1ii 2ii	Integral Gravity	PV	Closed	I	G-1	**Dry N_2**	Vent F	Yes	.50-5 .55-1(e)	NA	NA	G
1,1,2-Trichloroethane.	Atmos	Amb	III	1ii 2i	Integral Gravity	PV	Restr	II	G-1	NR	Vent F	No	.50-73 .56-1(a)	I-D	NA	G
Trichloroethylene	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	No	I-D	NA	G
1,2,3-Trichloropropane.	Atmos.	Amb.	II	1ii 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-73** **.56-1(a)**	NA	NA	G
Triethanolamine	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(b)	NA	NA	G
Triethylamine	Atmos.	Amb.	II	1ii 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(e)	I-C	NA	G
Triethylenetetramine	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(b)	NA	NA	G
Urea, Ammonium nitrate solution (containing more than 2% NH_3).	Atmos.	Amb.	III	1i 2i	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	No	**.56-1(b)**	I-D	NA	G
Valeraldehyde (iso-, n-).	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	Inert	Vent F	Yes	No	I-C	NA	G

Vanillan black liquor (free alkali content 3% or more).	Atmos.	Amb.	III	1i 2i	Integral Gravity	Open	Open	II	G-1	NR	NR	No	.50-73 .56-1(a), (c), (g).	NA	NA	G
Vinyl acetate	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Open	II	G-1	NR	**Vent F**	Yes	**.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Vinyl chloride	Press.	Amb.	II	1NA 2ii	Ind. Pressure	SR	Closed	II	P-2	NR	Vent F	Yes	.50-30 .50-34	I-D	NA	8
Vinyl chloride	Atmos.	Low	II	1NA 2ii	Ind. Gravity	PV	Closed	II-L	G-2	NR	Vent F	Yes	.50-30 .50-34	I-D	.40-1(b)(1)	8
Vinylidene chloride	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity	PV	Closed	II	P-2	Padded	Vent F	Yes	.55-1(f) **.50-70(a)** **.50-81(a), (b)**	I-D	NA	G
Vinyltoluene	Atmos.	Amb.	III	1i 2ii	Integral Gravity	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a) **.50-81** .56-1(a), **(b)**, (c), **(g)**.	I-D	NA	G
For requirements see these sections:.			151.10-1	151.13-5	151.15-1	151.15-5	151.15-10	151.20-1	151.20-5	151.25-1	151.25-2	151.30		111.105 (Subchapter J)	151.40	151.04-5

Items in **boldface** are changes.

Terms and symbols:

Segregation—Tank—
Line 1—Segregation of cargo from surrounding waters:
i = Skin of vessel (single skin) only required. Cargo tank wall can be vessel's hull.
ii = Double skin required. Cargo tank wall cannot be vessel's hull.
Line 2—Segregation of cargo space from machinery spaces and other spaces which have or could have a source of ignition:
i = Single bulkhead only required. Tank wall can be sole separating medium.
ii = Double bulkhead required. Cofferdam, empty tank, pumproom, tank with Grade E Liquid (if compatible with cargo) is satisfactory.
Internal tank inspection—
G—Indicates cargo is subject to general provisions of 151.04-5(b).
Specific numbers in this column are changes from the general provisions.

Abbreviations used:

Tank type: Ind = Independent.
Vent:
PV = Pressure vacuum valve.
SR = Safety relief.
Gauging device: Restr. = Restricted.

General usage:

NR = No requirement.
NA = Not applicable.

[CGD 88-100, 54 FR 40029, Sept. 29, 1989, as amended by CGD 85-061, 54 FR 50966, Dec. 11, 1989; CGD 88-100, 55 FR 17277, Apr. 24, 1990]

Subpart 151.10—Barge Hull Construction Requirements

§ 151.10-1 Barge hull classifications.

(a) Each barge constructed or converted in conformance with this subpart shall be assigned a hull type number.

(1) Effective dates for certain requirements:

(i) Barges constructed or converted between July 1, 1964, and June 1, 1970, in accordance with the construction requirements of §§ 32.63 and 98.03 of this chapter are considered to comply with the basic provisions of this subpart and will retain the hull type classification for the service for which they were originally approved. Changes in product endorsement will not be considered a change in service, except when a change to a product of higher specific gravity necessitates a reevaluation of the intact and damage stability requirements in subpart E of part 172 of this chapter.

(b) For this purpose the barge hull types shall be defined as follows:

(1) *Type I barge hull.* Barge hulls classed as Type I are those designed to carry products which require the maximum preventive measures to preclude the uncontrolled release of the cargo. These barges are required to meet:

(i) Standards of intact stability and a modified two compartment standard of subdivision and damage stability, as specified in subpart E of part 172 of this chapter; and

(ii) Hull structural requirements, including an assumed grounding condition.

(2) *Type I-S (special) barge hulls.* Type I-S (special) barge hulls are those constructed or converted for the carriage of chlorine in bulk prior to July 1, 1964, and modified to higher stability standards prior to July 1, 1968, but not meeting the requirements for full Type I classification.

(3) *Type II barge hull.* Barge hulls classed as Type II are those designed to carry products which require significant preventive measures to preclude the uncontrolled release of the cargo. These barges are required to meet:

(i) Standards of intact stability and a modified one compartment standard of subdivision and damage stability, as specified in Subpart E of Part 172 this chapter; and

(ii) Hull structural requirements, cluding an assumed grounding cond tion.

(4) *Type III barge hull.* Barge hul classed as Type III are those designe to carry products of sufficient hazar to require a moderate degree of co trol. These barges are required meet:

(i) Standards of intact stability specified in Subpart E of Part 172 this chapter; and

(ii) Hull structural requirements.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, amended by CGD 79-023, 48 FR 51008, No 4, 1983; CGD 88-100, 54 FR 40040, Sept. 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.10-5 Subdivision and stability.

Each barge must meet the applica requirements in subchapter S of th chapter.

[CGD 70-023, 48 FR 51009, Nov. 4, 1983]

§ 151.10-15 Certificate endorsement.

(a)-(b) [Reserved]

(c) *Certificate endorsement.* The lowing information shall be submitte and upon approval of calculatio shall form part of the endorsement the Certificate of Inspection:

(1) Limiting draft for each hull ty service for which approval is reque ed.

(2) Maximum density (lb./gal.) maximum cargo weight (tons) for ea tank for which approval is requeste Their weights will normally refle uniform loading except that for th purposes the individual tank ca weight may exceed the uniform lo ing tank cargo weight, correspondi to the barge fresh water deadweight the limiting draft, by 5 percent. Whe a greater degree of nonuniform lo ing is desired, longitudinal streng calculations shall be submitted.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, amended by CGD 79-023, 48 FR 51009, N 4, 1983]

§ 151.10-20 Hull construction.

(a) *Construction features.* (1) Ea barge hull shall be constructed with suitable bow form (length, shape, height of headlog) to protect against diving at the maximum speed at which the barge is designed to be towed. In any integrated tow, only the lead barge need comply with this requirement.

(2) All "open hopper" type barges shall be provided with coamings around the hopper space and a 36-inch minimum height plowshare breakwater on the forward rake. The plowshare breakwater may be omitted, if it is demonstrated to the satisfaction of the Commandant that sufficient protection is achieved without it. Coamings shall have a minimum height of 36 inches forward and may be graduated to a minimum height of 24 inches at midlength and 18 inches thereafter. All hopper barges constructed with a weathertight rain shield over the hopper space are exempt from these requirements, except that they shall be provided with an 18-inch minimum coaming all around the hopper.

(3) All "open hopper" type barges modified for the carriage of chlorine in bulk shall be provided with 36-inch minimum height coamings around the hopper.

(4) All barges in ocean or coastwise service shall be provided with a structural deck and hatches in accordance with the applicable provisions of Subchapter E of this chapter and the scantling requirements of the American Bureau of Shipping.

(b) *Hull structural requirements.* (1) All Types I, II, and III barges shall comply with the basic structural requirements of the American Bureau of Shipping for barges of the ordinary types and the applicable supplementary requirements of this section.

(2) Types I and II barges in inland service: A grounding condition shall be assumed where the forward rake bulkhead rests upon a pinnacle at the water surface. The maximum hull and tank bending moment and tank saddle reactions (if applicable) shall be determined. The hull bending stress shall not exceed the applicable limits of paragraphs (b)(2) (i), (ii), or (iii) of this section. The maximum tank bending moment and saddle reaction shall be used in the tank design calculations required by § 151.15-2(b)(3).

(i) Independent tanks supported by only two saddles do not contribute to the strength and stiffness of the barge hull. In such case, the hull stress shall not exceed either 50 percent of the minimum ultimate tensile strength of the material or 70 percent of the yield strength when specified, whichever is greater.

(ii) Independent tanks supported by three or more saddles contribute to the strength and stiffness of the hull. In such case, the hull stress shall not exceed the percentage stress values prescribed in § 151.10-20(b)(2)(i), multiplied by the quantity

$$(1.5 - SWT/UTS),$$

where *SWT* is the stress calculated without including the effect of the tanks, and *UTS* is the minimum ultimate tensile strength of the material. The value *SWT*, however, shall in no case be more than 75 percent of *UTS*.

(iii) Integral tanks may be considered as contributing to the strength and stiffness of the barge hull. The hull stresses for integral tank barges shall not exceed the percentage stress values prescribed in paragraph (b)(2)(i), of this section.

(3) Types I and II barges in ocean service:

(i) Independent tank barges with tanks supported by three or more saddles shall be subjected to a $0.6L^{0.6}$ trochoidal wave hogsag analysis to determine the maximum hull and tank bending moments and tank saddle reactions.

(ii) All independent tank barges, regardless of the number of saddle supports shall be subject to a still water bending analysis to determine the hull bending moment. For those barges with independent tanks supported by three or more saddles, this analysis shall consider tank-hull interaction so as to determine tank bending moments and saddle reactions.

(iii) The still water tank bending moments and saddle reactions shall be superimposed upon those obtained by simultaneous application of the following dynamic loadings:

(*a*) Rolling 30° each side (120° full cycle) in 10 seconds.

(*b*) Pitching 6° half amplitude (24° full cycle) in 7 seconds.

(*c*) Heaving *L*/80 half amplitude (*L*/20 full cycle) in 8 seconds.

(iv) The hull structure and saddle support system shall be analyzed, using the maximum hull bending moments and saddle reactions obtained from the foregoing. Bending stress shall not exceed 60 percent of the yield strength or 42 percent of the minimum tensile strength of the material, whichever is less. Critical buckling strength shall be at least 75 percent greater than calculated buckling stresses. The maximum tank bending moments and saddle reactions shall be used in the tank design calculations required by § 151.15-3(b)(8).

Subpart 151.12—Equipment and Operating Requirements for Control of Pollution From Category D NLS Cargoes

Source: CGD 81-101, 52 FR 7777, Mar. 12, 1987, unless otherwise noted.

§ 151.12-5 Equipment for Category D NLS.

The Coast Guard endorses the Certificate of Inspection and for ships making foreign voyages issues the endorsed NLS Certificate required by § 151.12-10 for an oceangoing non-self-propelled ship to carry as bulk cargo the following Category D NLSs if the ship meets the requirements of this part and the requirements applying to ships that carry Category D NLS cargoes in §§ 153.470, 153.486, and 153.490 of this chapter:

Acetic acid
Acrylic acid
Adiponitrile
Aminoethylethanolamine
Ammonium bisulfite solution
Butyl methacrylate
Caustic soda solution
Chlorohydrins (*crude*)
Coal tar pitch
Cyclohexanone
Dichloromethane
2,2-Dichloropropionic acid
Diethylenetriamine
N,N-Dimethylacetamide
Dimethylethanolamine
Dimethylformamide
1,4-Dioxane
Ethanolamine
Ethylcyclohexylamine
Ethylene cyanohydrin
Ethyl methacrylate
Formic acid
Glutaraldehyde solution
Hydrochloric acid
Mesityl oxide
Methyl methacrylate
Morpholine
1- or 2-Nitropropane
Phosphoric acid
Polyethylene polyamine
Polymethylene polyphenyl isocyanate
Propionic acid
Propylene oxide
iso-Propyl ether
Pyridine
Tetraethylenepentamine
Tetrahydrofuran
Triethanolamine
Triethylenetetramine
n-Valeraldehyde

[CGD 81-101, 52 FR 7777, Mar. 12, 1989, a
amended by CGD 88-100, 54 FR 40040, Sep
29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.12-10 Operation of oceangoing non-self-propelled ships Carrying Categor D NLS.

(a) An oceangoing non-self-propelle ship may not carry in a cargo tank a Category D NLS cargo listed unde § 151.12-5 unless the ship has on boar a Certificate of Inspection and fo ships making foreign voyages an NLS Certificate endorsed under that se tion to allow the cargo tank to carr the NLS cargo.

(b) The person in charge of a oceangoing non-self-propelled shi that carries a Category D NLS liste under § 151.12-5 shall ensure that th ship is operated as prescribed for th operation of oceangoing ships carryin Category D NLSs in §§ 153.90 153.909, 153.1100, 153.1102, 153.110 153.1106, 153.1124, 153.1126, 153.112 153.1130 and 153.1132 of this chapte

[CGD 81-101, 52 FR 7777, Mar. 12, 1987, a
amended by CGD 81-101, 53 FR 28974, Au
1, 1988 and 54 FR 12629, Mar. 28, 1989]

Subpart 151.13—Cargo Segregatio

§ 151.13-1 General.

(a) This subpart prescribes the r quirements for cargo segregation fo cargo tanks, cargo piping, and carg vents. These requirements are base on considerations of cargo reactivit stability, and contamination of the surroundings and other cargoes.

§ 151.13-5 Cargo segregation—tanks.

(a) The configurations listed in this paragraph refer to the separation of the cargo from its surroundings and list the various degrees of segregation required. Paragraphs (a)(1), (2), and (3) of this section explain the symbols used in lines 1 and 2, in order, under the tank segregation column of Table 151.05.

(1) Segregation of cargo from surrounding waters (Line 1 of Table 151.05)

i=Skin of vessel (single skin) only required. Cargo tank wall can be vessel's hull.

ii=Double skin required. Cargo tank wall cannot be vessel's hull.

NA=Nonapplicable for this case. Independent tanks already have such segregation built in through design.

(2) Segregation of cargo space from machinery spaces and other spaces which have or could have a source of ignition (Line 2 of Table 151.05).

i=Single bulkhead only required. Tank wall can be sole separating medium.

ii=Double bulkhead, required. Cofferdam, empty tank, pumproom, tank with Grade E Liquid (if compatible with cargo) is satisfactory.

(b) [Reserved]

(c) If a cofferdam is required for segregation purposes and a secondary barrier is required for low temperature protection by § 151.15-3(d)(4), the void space between the primary and secondary barriers shall not be acceptable in lieu of the required cofferdam.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 75-59, 45 FR 70273, Oct. 23, 1980]

Subpart 151.15—Tanks

§ 151.15-1 Tank types.

This section lists the definitions of the various tank types required for cargo containment by Table 151.05.

(a) *Integral.* A cargo containment envelope which forms a part of the vessel's hull in which it is built, and may be stressed in the same manner and by the same loads which stress the contiguous hull structure. An integral tank is essential to the structural completeness of its vessel's hull.

(b) *Independent.* A cargo containment envelope which is not a contiguous part of the hull structure. An independent tank is built and installed so as to eliminate, wherever possible (or, in any event, to minimize) its stressing as a result of stressing or motion of the adjacent hull structure. In general, therefore, motion of parts of the tank relative to the adjacent hull structure is possible. An independent tank is not essential to the structural completeness of its carrying vessel's hull.

(c) *Gravity.* Tanks having a design pressure (as described in Part 54 of this chapter) not greater than 10 pounds per square inch gauge and of prismatic shape or other geometry where stress analysis is neither readily nor completely determinate. (Integral tanks are of the gravity type.)

(d) *Pressure.* Independent tanks whose design pressure (as described in Part 54 of this chapter) is above 10 pounds per square inch gauge and fabricated in accordance with part 54, of this chapter. Independent gravity tanks which are of normal pressure vessel configuration (i.e., bodies of revolution, in which the stresses are readily determinate) shall be classed as pressure vessel type tanks even though their maximum allowable working pressure is less than 10 pounds per square inch gauge. Pressure vessel tanks shall be of Classes I, I-L, II, II-L, or III, as defined in subchapter F of this chapter.

§ 151.15-3 Construction.

This section lists the requirements for construction of the types of cargo tanks defined in § 151.15-1.

(a) *Gravity type tanks.* Gravity type cargo tanks vented at a pressure of 4 pounds per square inch gauge or less shall be constructed and tested as required by standards established by the American Bureau of Shipping or other recognized classification society. Gravity type tanks vented at a pressure exceeding 4 but not exceeding 10 pounds per square inch gauge will be given special consideration by the Commandant.

(b) *Pressure vessel type tanks.* Pressure vessel type tanks shall be designed and tested in accordance with the requirements of Part 54 of this chapter.

(1) Uninsulated cargo tanks, where the cargo is transported, at or near ambient temperatures, shall be designed for a pressure not less than the vapor pressure of the cargo at 115° F. The design shall also be based on the minimum internal pressure (maximum vacuum), plus the maximum external static head to which the tank may be subjected.

(2) When cargo tanks, in which the cargo is transported at or near ambient temperature, are insulated with an insulation material of a thickness to provide a thermal conductance of not more than 0.075 B.t.u. per square foot per degree Fahrenheit differential in temperature per hour, the tanks shall be designed for a pressure of not less than the vapor pressure of the cargo at 105° F. The insulation shall also meet the requirements of paragraph (f) of this section.

(3) Cargo tanks in which the temperature is maintained below the normal atmospheric temperature by refrigeration or other acceptable means shall be designed for a pressure of not less than 110 percent of the vapor pressure corresponding to the temperature of the liquid at which the system is maintained, or the pressure corresponding to the greatest dynamic and static loads expected to be encountered in service. For mechanically stressed relieved cargo tanks, additional factors relating design pressure and maximum allowable pressure shall be as specified by the Commandant. The material of the tank shall meet the material requirements specified in part 54 of this chapter for the service temperature, and this temperature shall be permanently marked on the tank as prescribed in § 54.10–20 of this chapter.

(4) The maximum allowable temperature of the cargo is defined as the boiling temperature of the liquid at a pressure equal to the setting of the relief valve.

(5) The service temperature is the minimum temperature of a product at which it may be contained, loaded and/or transported. However, the service temperature shall in no case be taken higher than given by the following formula.

$$t_s = t_w - 0.25(t_w - t_a)$$

where:

t_s = Service temperature.

t_w = Boiling temperature of gas at normal working pressure of container but not higher than +32° F.

t_a = Boiling temperature of gas at atmospheric pressure.

Under normal circumstances, only temperatures due to refrigerated service will be considered in determining the service temperature. Refrigerated service for purposes of this paragraph is defined as service where the temperature is controlled in the process rather than being caused by atmospheric conditions.

(6) Heat transmission studies, where required, shall assume the minimum ambient temperatures of 0° F. still air and 32° F. still water, and maximum ambient temperatures of 115° F. still air and 90° F. still water.

(7) Where applicable, the design of the cargo tanks shall investigate the thermal stresses induced in the tanks at the service temperature.

(8) Calculations showing the stress level in the tanks under dynamic loading conditions for ocean service barges (see § 151.10–20(b)(4)) and grounding conditions for inland service barges (see § 151.10–20–(b)(2)) shall be submitted to the Commandant for approval. These calculations shall take into account the local stresses due to the interaction between the barge hull and the tanks.

(c) *High density cargo.* Cargoes with a specific gravity greater than that for which the scantlings of the tank are designed may be carried provided that:

(1) The maximum cargo weight (tons) in a specific tank does not exceed the maximum cargo weight (tons) endorsed on the certificate of inspection.

(2) The scantlings of the tank are sufficient to prevent rupture under the full head of the higher density cargo. Scantlings meeting ordinary bulkhead requirements for the full head will satisfy this requirement.

(d) *Arrangements*—(1) *Collision protection.* (i) Tanks containing cargoes which are required to be carried in Type I hulls by Table 151.05 shall be located a minimum of 4 feet inboard from the side shell and box end of the vessel. Tanks containing cargoes which are required to be carried in Type II hulls by Table 151.05 shall be located a minimum of 3 feet inboard from the side shell and box end of the vessel.

(ii) All independent cargo tanks installed on Type I or Type II barge hulls shall be protected with suitable collision chocks or collision straps. A longitudinal collision load of one and one half times the combined weight of the tank and the cargo shall be assumed. All other independent cargo tanks shall be provided with suitable collision chocks or collision straps assuming a longitudinal collision load equal to the combined weight of the tank and the cargo. The design bearing stress shall not exceed 2 times the yield strength or 1.5 times the minimum ultimate strength, whichever is less.

(iii) Tanks containing cargoes, which are required to be carried in Type I or Type II hulls by Table 151.05, shall be located a minimum of 25 feet from the head log at the bow. Box barges and trail barges need not comply with this requirement.

(2) *Inspection clearances.* The distance between tanks or between a tank and the vessel's structure shall be such as to provide adequate access for inspection and maintenance of all tank surfaces and hull structure; but shall not normally be less than 15 inches except in way of web frames or similar major structural members where the minimum clearance shall be equal to the flange or faceplate width.

(3) *Access openings.* Each tank shall be provided with at least a 15" x 18" diameter manhole, fitted with a cover located above the maximum liquid level as close as possible to the top of the tank. Where access trunks are fitted to tanks, the diameter of the trunks shall be at least 30 inches.

(4) *Low temperature protection.* (i) When low temperature cargoes are to be carried in gravity type tanks at a temperature lower than that for which the hull steel is adequate, a secondary barrier designed to contain leaked cargo temporarily shall be provided. The design of the cargo containment system shall be such that under normal service conditions, or upon failure of the primary tank, the hull structure shall not be cooled down to a temperature which is unsafe for the materials involved. The secondary barrier and structural components of the hull which may be exposed to low temperatures shall meet the material requirements (i.e., chemistry and physical properties) specified in Part 54 of this chapter for the service temperature involved. Heat transmission studies and tests may be required to demonstrate that the structural material temperatures in the hull are acceptable.

(ii) The design shall take into consideration the thermal stresses induced in the cargo tank at the service temperature during loading.

(iii) Where necessary, devices for spray loading or other methods of precooling or cooling during loading shall be included in the design.

(iv) Pressure-vessel type tanks shall be radiographed in accordance with the requirements of Part 54 of this chapter. For gravity type tanks, all weld intersections or crossings in joints of primary tank shells shall be radiographed for a distance of 10 thicknesses from the intersection. All other welding in the primary tank and in the secondary barrier, shall be spot radiographed in accordance with the requirements specified in Part 54 of this chapter for Class II-L pressure vessels.

(v) For nonpressure vessel type containment systems, access shall be arranged to permit inspection one side each of the primary tank and secondary barrier, under normal shipyard conditions. Containment systems which, because of their peculiar design, cannot be visually inspected to this degree, may be specially considered provided an equivalent degree of safety is attained.

(e) *Installation of cargo tanks.* (1) Cargo tanks shall be supported on foundations of steel or other suitable material and securely anchored in place to prevent the tanks from shifting when subjected to external forces. Each tank shall be supported so as to prevent the concentration of excessive loads on the supporting portions of the shell or head.

(2) Foundations, and stays where required, shall be designed for support and constraint of the weight of the full tank, and the dynamic loads imposed thereon. Thermal movement shall also be considered.

(3) Foundations and stays shall be suitable for the temperatures they will experience at design conditions.

(4) Cargo tanks may be installed "on deck," "under deck," or with the tanks protruding through the deck. All tanks shall be installed with the manhole openings located in the open above the weather deck. Provided an equivalent degree of safety is attained, the Commandant may approve cargo tanks installed with manhole openings located below the weather deck. Where a portion of the tank extends above the weather deck, provision shall be made to maintain the weathertightness of the deck, except that the weathertightness of the upper deck need not be maintained on:

(i) Vessels operating on restricted routes which are sufficiently protected; or,

(ii) Open hopper type barges of acceptable design.

(5) No welding shall be performed on tanks which require and have been stress relieved unless authorized by the Commandant.

(f) *Materials.* (1) Materials used in the construction of cargo tanks shall be suitable for the intended application and shall be in accordance with the applicable requirements of Part 54 of this chapter. For cargoes carried at low temperatures, the tank supports and foundations, and portions of the hull which may be exposed to low temperature, shall also meet the applicable requirements of that part.

(2) When required, cargo tanks shall be lined with rubber or other material acceptable to the Commandant. The interior surfaces of the cargo tanks shall be made smooth, welds chipped or ground smooth, and the surfaces thoroughly cleaned before the lining is applied. The lining material shall be resistive to attack by the cargo, not less elastic than the metal of the tank proper, and nonporous when tested after application. It shall be of substantially uniform thickness. The lining shall be directly bonded to the tank plating, or attached by other satisfactory means acceptable to the Commandant.

(g) *Insulation.* (1) Insulation, where provided, shall be compatible with the cargo and the tank materials.

(2) Insulation in a location exposed to possible high temperature or source of ignition shall be one of the following:

(i) Incombustible, complying with the requirements of Subpart 164.009 of Part 164 of this chapter; or

(ii) Fire retardant, having a flame spread rating of 50 or less as determined by ASTM Specification E-84 (Tunnel Test); or,

(iii) Nonburning or "self-extinguishing" as determined by ASTM Specification D-1692, "Flammability of Plastics" and covered by a steel jacket having a minimum thickness of 18 gauge (0.0428 inches) (U.S. Standard Gauge) or an equivalent means of protection acceptable to the Commandant.

(3) Insulation in a location protected against high temperature or source of ignition need satisfy no requirements for combustibility.

(4) Insulation shall be impervious to water vapor, or have a vapor-proof coating of a fire-retardant material acceptable to the Commandant. Unless the vapor barrier is inherently weather resistant, tanks exposed to the weather shall be fitted with a removable sheet metal jacket of not less than 18 gauge over the vapor-proof coating and flashed around all openings so as to be weathertight. Insulation which is not exposed to the weather when installed on tanks carrying cargoes above ambient temperatures need not be impervious to water vapor nor be covered with a vapor-proof coating.

(5) Insulation shall be adequately protected in areas of possible mechanical damage.

(h) *Fire exposure protection.* Tanks which are provided with fire exposure protection of one of the following categories may be allowed a reduction in the size of relief valves.

(1) Approved incombustible insulation meeting the requirements of subpart 164.007 of part 164 of this chapter which is secured to the tank with steel bands.

(2) Located in a hold or protected by a self-supporting steel jacket or cover (such as a hopper cover) of at least 10 gauge (0.1345) for insulation.

(i) Tanks not protected against fire exposure as described in this paragraph shall not be permitted a reduction in size of relief valves.

[CPGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989]

§ 151.15-5 Venting.

This section contains definitions and requirements for the various methods of venting specified in Table 151.05. In addition to the requirement that all vents must penetrate into tanks at the top of the vapor space, the following methods of venting and the applicable restrictions are listed:

(a) *Open venting.* A venting system which offers no restriction (except pipe losses and flame screen, where used) to the movement of liquid or vapor to or from the cargo tank (via the vent) under normal operating conditions. The total cross-sectional area of the vents shall not be less than the total cross-sectional area of the filling pipe or pipes. Ullage openings may be counted as part of the required cross-sectional area: *Provided,* That each cargo tank has at least one permanent vent. The minimum size of a cargo tank vent shall be not less than 2½ inches. The outlet end of the vent shall terminate in a gooseneck bend and shall be located at a reasonable height above the weather deck, clear of all obstructions. No shut-off valve or frangible disk shall be fitted in the vent lines except that a float check valve may be installed so as to exclude the entry of water into the tank (i.e., to prevent downflooding). An open venting system may be fitted with a flame screen.

(b) *Pressure-vacuum venting.* A normally closed venting system fitted with a device to automatically limit the pressure or vacuum in the tank to design limits. Pressure-vacuum relief valves shall comply with the requirements of subpart 162.017 of this chapter. The required capacity of the venting system shall be in accordance with Part 54 of this chapter.

(c) *Safety relief venting.* A closed venting system fitted with a device to automatically limit the pressure in the tank to below its maximum allowable working pressure. The maximum safety relief valve setting shall not exceed the maximum allowable working pressure of the tank. For cargoes carried at ambient temperatures, the minimum safety relief valve setting shall correspond to the saturated vapor pressure of the cargo at 105° F. if carried in an insulated tank, or 115° F. if carried in an uninsulated tank. For cargoes carried below ambient temperature, the safety relief valve setting shall be selected to provide a suitable margin between normal operating pressure of the tank and the opening pressure of the valve but in no case shall it exceed the maximum allowable working pressure of the tank. The safety relief valves shall be of a type approved under subparts 162.001 or 162.018 of subchapter Q of this chapter. The required capacity of the safety relief valves shall be in accordance with the requirements of part 54 of this chapter.

(d) *Rupture disks.* (1) When required by the nature of the cargo, rupture disks may be installed in lieu of or in addition to other pressure limiting devices in accordance with the requirements of § 54.15-13 of this chapter.

(2) When a pressure-vacuum relief valve or safety relief valve normally protected by a rupture disk or breaking pin device is exposed to the cargo due to breakage of the disk, the valve shall be reinspected before being returned to service.

§ 151.15-6 Venting piping.

(a) The back pressure in the relief valve discharge lines shall be taken into account when determining the flow capacity of the relief valve to be used. The back pressure in the discharge line shall be limited to 10 percent of the valve operating pressure or a compensating-type valve shall be used. Suitable provision shall be made for draining condensate which may accumulate in the vent piping.

§ 151.15-10 Cargo gauging devices.

This section contains definitions and requirements for types of gauging devices specified in Table 151.05.

(a) *Open gauging.* A gauging method which uses an opening in the cargo tank and which may expose the gauge user to the cargo and its vapors. Examples of this type are gauge hatch, ullage hole.

(b) *Restricted.* A gauging device which penetrates the cargo tank and which, in operation, causes or permits the release to the atmosphere of small quantities of cargo vapor or liquid. The amount of cargo released is controlled by the small diameter of the tank penetration opening and by a locally operated valve or similar closure device in that opening. When not in use, this type gauging device is closed to maintain the complete integrity of cargo containment. Examples of this type are rotary tube, fixed tube, slip tube, sounding tube. (See §§ 151.03-43 and 151.15-10(g).)

(c) *Closed.* A gauging device which penetrates the cargo tank, but which is part of a closed system maintaining the complete integrity of cargo containment. This device is designed and installed so as not to release cargo liquid or vapor in any amount to the atmosphere. Examples of this type are automatic float, continuous tape (magnetic coupled), sight glass (protected), electronic probe, magnetic, differential pressure cell.

(d) *Isolated or indirect.* A gauging method or device which is isolated from the tank (no penetration of the tank shell) and which may employ an indirect measurement to obtain the desired quantity. Examples of this type are weighing of cargo, sonic depth gauge (without penetration of tank shell), pipe flow meter.

(e) All gauging devices and related fixtures which form a part of the cargo containment barrier shall be of suitable material and shall be designed for the pressure and temperature of the cargo in accordance with the requirements of Subchapter F of this chapter.

(f) *Use of restricted gauging devices.*

(1) When required in Table 151.0 cargoes carried under pressure sha have restricted gauging devices d signed so that the maximum blee valve opening is not larger than 0.05 diameter, unless provided with excess flow valve. Sounding tubes prohibited for use with cargoes havi a vapor pressure in excess of 14 p.s.i.a. at 115° F., if carried in an uni sulated tank, or at 105° F., if carried i an insulated tank.

(2) When utilizing a sounding tube the cargo tank vent system shall b designed to prevent the discharge o cargo through the sounding tube du to pressure build up in the cargo ta vapor space. (See § 151.03-43) Whe cargoes carried at atmospheric pre sure are required to have a restricte gauging device, open gauges may b provided in addition to restricte gauges for this type of cargo. Howeve open gauges may not be used whi cargo transfer operations are actual being performed.

(g) Fixed tube gauges are not accep able as primary means of gaugin They may be used as a check on th calibration of other gauging devices

(h) For pressure-vessel type tan each automatic float, continuous rea ing tape or similar type gauge n mounted directly on the tank or do shall be fitted with a shutoff device lo cated as close to the tank as practi ble. When an automatic float gaug device, which gauges the entire heig of the tank, is used, a fixed tube gau set in the range of 85 percent to percent of the water capacity of th tank shall be provided in addition a means of checking the accuracy of th automatic float gauge, or other alte nate means acceptable to the Co mandant may be used.

(i) Gauge glasses of the colum type are prohibited.

(j) Flat sight glasses may be used i the design of automatic float conti ous reading tape gauges. However su glasses shall be made of high stren material, suitable for the operati temperatures, of not less than on half inch in thickness and adequate protected by a metal cover.

Subpart 151.20—Cargo Transfer

§ 151.20-1 Piping—general.

(a) Cargo piping systems shall be arranged and fabricated in accordance with this section and Subchapter F. The class of piping system required for a specific cargo shall be as listed in Table 151.05 as a minimum; however, a higher class may be required when the actual service temperature or pressure so dictates. See Table 56.04-2 of this chapter.

(b) Piping system components shall be suitable for use with the cargoes for which the barge is certificated, and shall be of materials listed in Subchapter F of this chapter, or such other material as the Commandant may specifically approve. All piping materials shall be tested in accordance with the requirements of Subchapter F of this chapter. The valve seat material, packing, gaskets, and all other material which comes into contact with the cargo shall be resistant to the chemical action of the cargoes for which the barge is certificated.

(c) Cargo piping systems, when subject to corrosive attack of the cargo, and when serving cargo tanks which are required by this subchapter to be lined or coated, shall be constructed of, lined or coated with corrosion-resistant material. Vent systems shall be similarly constructed, lined, or coated up to and including the vent control device.

(d) All piping systems components shall have a pressure rating at operating temperature (according to the applicable American National Standards Institute, Inc., pressure/temperature relations) not less than the maximum pressure to which the system may be subjected. Piping which is not protected by a relief valve, or which can be isolated from its relief valve, shall be designed for the greatest of:

(1) The cargo vapor pressure at 115° F.

(2) The maximum allowable working pressure of the cargo tank.

(3) The pressure of the associated pump or compressor relief valve.

(4) The total discharge head of the associated pump or compressor where a discharge relief valve is not used.

The escape from cargo piping system relief valves shall be run to venting system or to a suitable recovery system. Provisions shall be made for pressure relief of all piping, valves, fittings, etc., in which excessive pressure build-up may occur because of an increase in product temperature.

(e) Provisions shall be made by the use of offsets, loops, bends, expansion joints, etc., to protect the piping and tank from excessive stress due to thermal movement and/or movements of the tank and hull structure. Expansion joints shall be held to a minimum and where used shall be subject to individual approval by the Commandant.

(f) Low temperature piping shall be isolated from the hull structure. Where necessary, arrangements to provide for the protection of the hull structure from leaks in low temperature systems in way of pumps, flanges, etc., shall be provided.

(g) Connections to tanks shall be protected against mechanical damage and tampering. Underdeck cargo piping shall not be installed between the outboard side of cargo containment spaces and the skin of the barge, unless provision is made to maintain the minimum inspection and collision protection clearances (where required) between the piping and the skin. Cargo piping which is external to tanks, and is installed below the weather deck shall be joined by welding, except for flanged connections to shutoff valves and expansion joints.

(h) Piping shall enter independent cargo tanks above the weatherdeck, either through or as close to the tank dome as possible.

(i) Horizontal runs of cargo piping on integral tank barges may be run above or below the weatherdeck. When run below the weatherdeck, the following are applicable:

(1) Horizontal runs located entirely within integral cargo tanks shall be fitted with a stop valve, located inside the tank that is being serviced and operable from the weatherdeck. There shall be cargo compatibility in the event of a piping failure.

(2) Horizontal runs of cargo piping installed in pipe tunnels may penetrate gravity type tanks below the

weatherdeck: *Provided*, That each penetration is fitted with a stop valve operable from the weatherdeck. If the tunnel is directly accessible from the weatherdeck without penetrating the cargo tank, the stop valve shall be located on the tunnel side. If the tunnel is not accessible from the weatherdeck, the valve shall be located on the tank side of the penetration.

(3) The tunnel shall comply with all tank requirements for construction, location, ventilation, and electrical hazard. There shall be cargo compatibility in the event of a piping failure.

(4) The tunnel shall have no other openings except to the weatherdeck or a cargo pumproom.

§ 151.20-5 Cargo system valving requirements.

For the purpose of adequately controlling the cargo, both under normal operating and casualty conditions, every cargo piping system shall be provided with one of the following sets of control valves and meet the requirements listed below. Cargo tanks, whether gravity or pressure vessel type, for cargoes having a saturated vapor pressure of 10 pounds per square inch gauge or less at 115° F. (105° F. if the tank is insulated) shall be provided with a valving system designated as Gravity-1. Cargo tanks, whether gravity or pressure vessel type, for cargoes which are carried below ambient temperature and whose vapor pressure is maintained at 10 pounds per square inch gauge or below shall be provided with a valving system designated as Gravity-2. Cargo tanks for cargoes which have vapor pressures above 10 p.s.i.g. at 115° F. (105° F. if tank is insulated) shall be provided with a valving system designated as Pressure-1. Cargo tanks for cargoes which have vapor pressures above 10 pounds per square inch gauge at 115° F. (105° F. if tank is insulated) and which require greater protection due to their hazardous characteristics shall be provided with a valving system designated as Pressure-2. The requirements of paragraphs (a) through (d) of this section for stop valves or excess flow valves to be fitted at tank penetrations are not applicable to nozzles at which pressure vacuum or safety relief valves are fitted.

(a) *Gravity-1* (*G-1*). (1) One manually operated stop valve shall be installed on each tank filling and discharge line, located near the tank penetration.

(2) One stop valve or blind flange shall be installed at each cargo hose connection. When a cargo hose connection is in use, it shall be provided with a stop valve; which may be part of the vessel's equipment or may be part of the shore facility and attached to the barge end of the loading hose. When a cargo hose connection is not in use, it may be secured with a blind flange.

(3) If individual deepwell pumps are used to discharge the contents of each cargo tank, and the pumps are provided with a remote shutdown device, a stop valve at the tank is not required on the tank discharge line.

(b) *Gravity-2* (*G-2*). (1) One manually operated stop valve shall be installed on each tank penetration, located as close as possible to the tank.

(2) One remote operated, quick closing shut-off valve shall be installed at each cargo hose connection.

(3) A remote shutdown device shall be installed for all cargo handling machinery.

(c) *Pressure-1* (*P-1*). (1) One manually operated stop valve and one excess flow valve shall be installed on each tank penetration, located as close as possible to the tank.

(2) One manually operated stop valve shall be installed at each cargo hose connection, when in use.

(d) *Pressure-2* (*P-2*). (1) One manually operated stop valve and one excess flow valve shall be installed at each tank penetration, located as close as possible to the tank.

(2) One remote operated quick closing shutoff valve shall be installed at each cargo hose connection when in use.

(3) No tank penetration shall be less than 1 inch diameter.

(e) Cargo tank penetrations which are connections for gauging or measuring devices need not be equipped with excess flow or remote operated quick closing valves provided that the opening is constructed so that the outward flow of tank contents shall not exceed that passed by a No. 54 drill size (0.055-inch diameter).

(f) The control system for any required quick closing shutoff valves shall be such that the valves may be operated from at least two remote locations on the vessel; if means of fire protection is required by Table 151.05, the control system shall also be provided with fusible elements designed to melt between 208° F. and 220° F., which will cause the quick closing shutoff valves to close in case of fire. Quick closing shutoff valves shall be of the fail-closed (closed on loss of power) type and be capable of local manual operation. Quick closing shutoff valves shall operate from full open to full closed under all service conditions in not more than 10 seconds, without causing excessive pressure surges.

(g) Excess flow valves, where required, shall close automatically at the rated closing flow of vapor or liquid as tested and specified by the manufacturer. The piping, including fittings, valves, and appurtenances protected by an excess flow valve, shall have a greater capacity than the rated closing flow of the excess flow valve. Excess flow valves may be designed with a bypass not to exceed 0.040-inch diameter opening to allow equalization of pressure, after an operating shutdown.

(h) Suitable means shall be provided to relieve the pressure and remove liquid contents from cargo lines and hoses to the cargo tank or other safe location prior to effecting disconnections.

§ 151.20-10 Cargo system instrumentation.

(a) Each tank operated at other than ambient temperature shall be provided with at least one remote reading temperature sensor located in the liquid phase of the cargo. The temperature gauge shall be located at the cargo handling control station or another approved location.

(b) Where required, each tank equipped with safety relief valves shall be fitted with a pressure gauge which shall be located at the cargo handling control station or at another approved location.

§ 151.20-15 Cargo hose if carried on the barge.

(a) Liquid and vapor line hose used for cargo transfer shall be of suitable material resistant to the action of the cargo. Hose shall be suitable for the temperatures to which it may be subjected and shall be acceptable to the Commandant.

(b) Hose subject to tank pressure, or the discharge pressure of pumps or vapor compressors, shall be designed for a bursting pressure of not less than 5 times the maximum safety relief valve setting of the tank, pump, or compressor, whichever determines the maximum pressure to which the hose may be subjected in service.

(c) Each new type of cargo hose, complete with end fittings, shall be prototype tested to a pressure not less than five times its specified maximum working pressure. The hose temperature during this prototype test shall duplicate the intended extreme service temperature. Thereafter, each new length of cargo hose produced shall be hydrostatically tested at ambient temperature to a pressure not less than twice its maximum working pressure nor more than two-fifths its bursting pressure. The hose shall be marked with its maximum working pressure, and if used in other than ambient temperature service, its maximum or minimum temperature.

§ 151.20-20 Cargo transfer methods.

(a) Cargo transfer may be accomplished by means of gravity, pumping, vapor or gas pressurization, or fluid displacement unless otherwise provided in Subpart 151.50 of this part.

(b) Vapor or gas pressurization may be used only in transferring cargo from pressure vessel type cargo tanks. The pressurizing vapor or gas lines shall be provided with safety relief device in the lines set to open at a pressure no greater than 90 percent of the set pressure of the cargo tank safety relief valve. The pressurizing line shall be fitted with a stop valve at the tank, and a check valve to prevent the accidental release of cargo through the pressure line.

(c) Fluid displacement is permitted with either gravity or pressure vessel type cargo tanks. The displacing fluid shall enter the tank under low relative pressure. The fluid entry line shall be fitted with a safety relief valve set to lift at a pressure no higher than 80 percent of the cargo tank safety relief valve setting.

(d) When cargo vapors are flammable, combustible or toxic, cargo filling lines entering the top of the tank shall lead to a point at or near the bottom. Spray filling lines, discharging near the top of the tank, may be fitted in lieu of, or in addition to, the above cargo filling lines.

Subpart 151.25—Environmental Control

§ 151.25-1 Cargo tank.

When carrying certain commodities regulated by this subchapter, one of the following types of cargo protection may be required, within the main cargo tank, and in some cases, in the space between the primary and secondary barriers.

(a) *Inerted.* All vapor spaces within the cargo tank are filled and maintained with a gas or vapor which will not support combustion and which will not react with the cargo.

(b) *Padded.* All vapor spaces within the cargo tanks are filled and maintained with a liquid, gas (other than air), or vapor which will not react with the cargo.

(c) *Ventilated (forced).* Vapor space above the liquid surface in the tank is continuously swept with air by means of blowers or other mechanical devices requiring power.

(d) *Ventilated (natural).* Vapor space above the liquid surface in the tank is continuously swept with atmospheric air without the use of blowers or other mechanical devices requiring power (e.g., "chimney-effect" ventilation).

(e) *Dry.* All vapor space within the cargo tank is filled and maintained with a gas or vapor containing no more than 100 ppm water.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.25-2 Cargo handling space.

Pump rooms, compressor rooms, refrigeration rooms, heating rooms, instrument rooms or other closed spaces regularly entered by operating personnel, in which work is performed on the cargo or in which the cargo movement is locally controlled, may be required to be fitted with one of the following types of ventilation:

(a) *Forced ventilation.* The forced ventilation system shall be designed to insure sufficient air movement through these spaces to avoid the accumulation of toxic or flammable vapors and to insure sufficient oxygen to support life, and, in any event, the ventilation system shall have a minimum capacity sufficient to permit a change of air every 3 minutes.

(b) *Natural ventilation.* The natural ventilation system shall be designed to insure sufficient air movement to avoid the accumulation of toxic or flammable vapors and to insure sufficient oxygen to support life.

Subpart 151.30—Portable Fire Extinguishers

§ 151.30-1 Type.

When required by Table 151.05, approved portable fire extinguishers shall be installed in accordance with Subpart 34.50 of this chapter. The fire extinguishing media shall be dry chemical or other suitable agent for all locations.

Subpart 151.40—Temperature or Pressure Control Installations

§ 151.40-1 Definitions.

This section defines the various methods by which the cargo may be heated or cooled.

(a) *Boiloff.* Cargo pressure and temperatures are maintained by permitting the cargo to boil naturally and the cargo vapor thus generated removed from the tank by venting.

(b) *External cargo cooling*—(1) *Cargo vapor compression.* A refrigeration system in which the cargo vapors generated within the tank are withdrawn, compressed, and the lower energy vapor or its condensate returned to the tank.

(2) *External heat exchange.* A refrigeration system in which the cargo vapor or liquid is cooled outside the

cargo tanks by being passed through a heat exchanger. Refrigeration is not accomplished by direct compression of the cargo.

(c) *Internal heat exchange.* A refrigeration system in which a cooling fluid is passed through heat transfer coils immersed in the cargo tank liquid or vapor phases.

(d) *Tank refrigeration.* A refrigeration system in which the cooling fluid is passed around the cargo tank exterior in order to remove heat from the tank or its surroundings.

(e) *No refrigeration.* A system that allows the liquefied gas to warm up and increase in pressure. The insulation and tank design pressure shall be adequate to provide for a suitable margin for the operating time and temperatures involved.

(f) *Tank heating.* (1) A system in which the cargo is heated by means of steam or other heat transfer fluid running through coils within or around the tank. The cargo itself does not leave the tank.

(2) A recirculating system in which the cargo leaves the tank, is pumped through a heater and then returned to the tank.

§ 151.40-2 Materials.

Materials used in the construction of temperature or pressure control systems shall be suitable for the intended application and meet the requirements of Subchapter F and the Special Requirements section of this subchapter.

§ 151.40-5 Construction.

Construction of machinery or equipment, such as heat exchangers, condensers, piping, etc., associated with temperature or pressure control systems shall meet the requirements of Subchapter F of this chapter. The electrical portions of these installations shall meet the requirements of Subchapter J of this chapter.

§ 151.40-10 Operational requirements.

Control systems, required by Table 151.05 shall be provided with an audible or visual high cargo temperature or high cargo pressure alarm which is discernible at the towboat. The alarm shall operate when either the pressure or the temperature exceeds the operating limits of the system. The alarm may monitor either pressure or temperature, but must be independent of the control system.

§ 151.40-11 Refrigeration systems.

(a) *Boiloff systems.* The venting of cargo boiloff to atmosphere shall not be used as a primary means of temperature or pressure control unless specifically authorized by the Commandant.

(b) Vapor compression, tank refrigeration, and secondary refrigeration systems: The required cooling capacity of refrigeration systems shall be sufficient to maintain the cargo at design operating conditions with ambient temperature of 115° F. still air and 90° F. still water. The number and arrangement of compressors shall be such that the required cooling capacity of the system is maintained with one compressor inoperative. Portions of the system other than the compressors need not have standby capacity.

Subpart 151.45—Operations

§ 151.45-1 General.

(a) Barges certificated as tank barges (Subchapter D of this chapter) or cargo barges (Subchapter I of this chapter) for the carriage of cargoes regulated by this subchapter shall meet all applicable requirements for operations in the appropriate subchapter; in addition, requirements prescribed in this subpart shall apply to either type of certification.

§ 151.45-2 Special operating requirements.

(a) The requirements of this section shall apply to all barges carrying in bulk any cargoes regulated by this subchapter; however, the provisions of this section are not applicable to such barges when empty and gas-freed.

(b) When it is necessary to operate box or square-end barges as lead barges of tows, the person in charge of the towing vessel shall control the speed to insure protection against diving and swamping of such barges, having due regard to their design and freeboard, and to the operating conditions.

(c) No cargo tank hatch, ullage hole, or tank cleaning openings shall be opened or remain open except under the supervision of the person in charge, except when the tank is gas free.

(d) Barges, when tendered to the carrier for transportation, shall have all bilges and void spaces (except those used for ballasting) substantially free of water. Periodic inspections and necessary pumping shall be carried out to insure maintenance of such water-free condition in order to minimize the free surface effects, both in longitudinal and transverse directions. Except when otherwise considered necessary for inspection or pumping, all hatch covers and other hull closure devices for void spaces and hull compartments other than cargo spaces shall be closed and secured at all times.

(e) *Cargo signs and cards.* (1) Warning signs shall be displayed on the vessel, port and starboard, facing outboard without obstructions, at all times except when the vessel is gas free. The warning sign shall be rectangular and a minimum of 3 feet wide and 2 feet high. It shall be of sufficient size to accommodate the required alerting information, which shall be shown in black block style letters and numerals (characters) at least 3 inches high on a white background. The minimum spacing between adjacent words and lines of characters shall be 2 inches. The minimum spacing between adjacent characters shall be one-half inch. All characters shall have a minimum stroke width of one-half inch and shall be a minimum of 2 inches wide, except for the letters "M" and "W", which shall be a minimum of 3 inches wide, and except for the letter "I" and the Numeral "1", which may be ½-inch wide. The signs shall have a 2-inch minimum white border clear of characters. The signs shall be maintained legible. The alerting information shall include the following:

WARNING

DANGEROUS CARGO

(This sign may be covered or removed when Subchapter O commodities are not being carried.)

NO VISITORS

NO SMOKING

(This sign may be removed or covered when the commodity is not flammable or combustible.)

NO OPEN LIGHTS

(This sign may be removed or covered when the commodity is not flammable or combustible.)

(2)(i) Names and locations of all cargoes will be displayed in a readily discernible manner on all barges carrying one or more commodities regulated by this subchapter. This may be an individual sign at or on each tank or by a single sign similar to the following example:

Tank No.	*Carg*
1P	/xxx
1S	/xxx
2P	/xxx
2S	/xxx

These signs may be printed, handwritten, permanent or changeable, but be visible and readable at all times. These signs should be as readable, as those specified in paragraph (e)(1) of this section. Cargoes regulated by other subchapters will be included whenever carried simultaneously with commodities regulated by this subchapter.

(ii) When the dangerous cargo barge is carrying only a single product, the Warning Sign required by paragraph (e)(1) of this section can be considered as meeting the requirements for the cargo location sign. The name of the commodity shall be added to the Warning Sign.

(3) A cargo information card for each cargo regulated by this subchapter shall be carried on the bridge or in the pilot house of the towing vessel readily available for use by the person in charge of the watch. This information card shall also be carried aboard the barge, mounted near the Warning Sign required by paragraph (e)(1) of this section, in such position as to be easily read by a man standing on the deck of the barge. The minimum card size shall be 7" x 9½". The card shall have legible printing on one side only. The card shall be laminated in clear plastic or otherwise made weather-

proof. The following data shall be listed:

(i) *Cargo identification and characteristics.* Identification of the cargo, as listed in Table 151.05, its appearance and odor. A statement of the hazards involved and instructions for the safe handling of the cargo and, as applicable, the need for special cargo environments.

(ii) *Emergency procedures.* Precautions to be observed in the event of spills, leaks, or equipment or machinery breakdown and/or uncontrolled release of the cargo into the waterway or atmosphere. Precautions to be observed in the event of exposure of personnel to toxic cargoes.

(iii) *Firefighting procedures.* Precautions to be observed in the event of a fire occurring on or adjacent to the barge, and enumeration of firefighting media suitable for use in case of a cargo fire.

(f) *Surveillance.* During the time the cargo tanks contain any amount of liquid or gaseous dangerous cargoes requiring Type I or Type II barge hulls, the barge shall be under surveillance, as set forth in this paragraph:

(1) A strict watch of each unmanned barge in tow shall be maintained from the towing vessel while under way.

(2) A towing vessel engaged in transporting such unmanned barges shall not leave them unattended. When a barge is moored, but not gas free, it shall be under the care of a watchman who may be a member of the complement of the towing vessel, or a terminal employee, or other person. This person shall be responsible for the security of the barge and for keeping unauthorized persons off the barge. Such person shall be provided with, read, and have in his possession for ready reference the information cards required by paragraph (e) of this section.

(g) All cargo hatches shall be closed, dogged down, or otherwise tightly secured.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.45-3 Manning.

Except as provided for in this section, barges need not be manned unless in the judgment of the Officer in Charge, Marine Inspection, such manning is necessary for the protection of life and property and for safe operation of the vessel. Vessels requiring manning for safe operation shall be subject to additional requirements as determined by the Commandant. Towing vessels, while towing barges which are not required to be manned, shall be provided with and have on board the information card required by § 151.45-2(e)(3). This card shall be in the possession of the master or person in charge.

§ 151.45-4 Cargo handling.

(a) *Men on duty.* A sufficient number of persons shall be on duty to perform cargo transfer operations.

(1) When the product to be transferred has flammable or combustible characteristics as defined in this chapter, the shipper and the owners, charterer, agent, masters, or persons in charge of such barges shall insure that a person holding a valid license as master or mate of inspected, mechanically propelled vessels of more than 200 gross tons; pilot of inspected, mechanically propelled vessels; or engineer, or a certificated tankerman is on duty to perform transfer operations. This person is considered as the person in charge of the unmanned tank barge. In addition, the Officer in Charge, Marine Inspection, shall be furnished satisfactory, documentary evidence that this person is trained in, and capable of performing competently, the necessary operation which relates to the transfer of the specific cargo.

(2) When the product to be transferred does not meet the definition of flammability or combustibility as defined in these regulations, the shipper and the owners, charterer, agent, masters, or persons in charge of such barges shall insure that a person especially qualified in the handling of the specific cargo to be transferred shall be on duty to perform or supervise cargo transfer operations. This person shall be considered to be in charge of such operations. The Officer in Charge, Marine Inspection, shall be furnished satisfactory documentary

evidence that this person is trained in, and capable of performing competently, the necessary operation which relates to the transfer of such cargo.

(b) *Closing of sea and ballast valves.* All sea and ballast valves are to be properly aligned and lashed, or sealed in their correct position prior to beginning cargo transfer operations. Under no circumstances shall such valves be secured by locks.

(c) *Connecting for cargo transfer.* (1) Movement of the vessel shall be considered when making the cargo connections to insure safe cargo transfer. Suitable material shall be used in joints and in couplings when making connections to insure that they are tight. Under no circumstances shall less than three bolts be used in a bolted flanged coupling.

(2) When cargo connections are supported by the vessel's tackle, the person in charge of the transfer operations shall inspect the vessel to insure that sufficient tackles are used.

(3) Pans or buckets shall be placed under cargo hose connections.

(4) Cargo transfer operations for any cargo requiring a PV or safety relief venting device in Table 151.05 shall be performed with cargo hatch covers closed.

(d) *Inspection prior to transfer of cargo.* Prior to the transfer of cargo, the person in charge of the transfer operation shall inspect the barge and other cargo equipment to assure himself that the following conditions exist:

(1) The Certificate of Inspection is endorsed for the products to be loaded. Loading restrictions, if any, should be noted.

(2) Warning signs are displayed as required.

(3) Cargo information cards for the product are aboard.

(4) No repair work in way of cargo space is being carried out.

(5) Cargo connections and hatch covers conform with the provisions of paragraph (c) of this section and cargo valves are properly set.

(6) All connections for cargo transfer have been made to the vessel's fixed pipeline system.

(7) In transferring flammable or combustible cargoes, there are no fires or open flames present on the deck, or in any compartment which is located on, facing, open or adjacent to the part of the deck on which cargo connections have been made.

(8) The shore terminal or other tank vessel concerned has reported itself in readiness for transfer of cargo.

(9) All sea valves are properly set and those connected to the cargo piping are closed.

(10) When transferring flammable or combustible cargoes that a determination was made as to whether or not boiler and/or galley fires can be maintained with reasonable safety.

(e) *Duties of the person in charge during transfer operations.* The person in charge of the transfer operations shall control the operations as follows:

(1) Supervise the operation of the cargo system valves.

(2) Start transfer of cargo slowly.

(3) Observe cargo connections and hose for leakage.

(4) Observe operating pressure on cargo systems.

(5) Comply with loading limitations placed on the vessel by the Certificate of Inspection, if, any, for the purpose of not overloading individual tanks or the vessel.

(6) Observe the loading rate for the purpose of avoiding overflow of the tanks.

(f) Cargo transfer operations shall not be started or, if started, shall be discontinued under the following conditions:

(1) During severe electrical storms.

(2) If a fire occurs on the barge, the wharf or in the immediate vicinity.

(3) If potentially dangerous leakage occurs.

(g) No vessel shall come alongside or remain alongside a barge in way of its cargo tanks while it is transferring cargo unless the conditions then prevailing are mutually acceptable to the persons in charge of cargo handling.

(h) *Auxiliary steam, air, fuel, or electric current.* When discharging cargo from one or more barges, the towing vessel may furnish steam, air, fuel, or electric current for pumps on barges or dock, but in no case shall the cargo pass through or over the towing vessel.

(i) *Termination of transfer operations.* When transfer operations are completed, the valves on cargo connections on the vessel shall be closed. The cargo connections shall be drained of cargo.

(j) *Transfer of other cargo or stores on a barge.* (1) Packaged goods, freight, and ship's stores shall not be loaded or discharged during the loading of flammable cargoes except by permission of the person in charge of the transfer operation. Explosives shall not be loaded or carried on any barge containing products regulated by this subchapter.

(2) Where package and general cargo is carried directly over bulk cargo tanks, it shall be properly dunnaged to prevent chafing of metal parts and securely lashed or stowed.

(k) *Transportation of other cargo or stores on barges.* Barges may be permitted to transport deck cargoes directly over bulk cargo spaces when the nature of such deck cargoes and the methods of loading and unloading same do not create an undue hazard. Such barges shall have their decks properly dunnaged to prevent chafing between the steel parts of the vessel and the deck cargo.

(l) Deck construction must be adequate to support the intended load. Provisions for carrying deck cargo shall be endorsed on the Certificate of Inspection by the Officer in Charge, Marine Inspection.

(m) *Emergencies.* In case of emergencies, nothing in the regulations in this subchapter shall be construed as preventing the person in charge of transfer operations from pursuing the most effective action in his judgment for rectifying the conditions causing the emergency.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970; 35 FR 6431, Apr. 22, 1970, as amended by CGD 75-59, 45 FR 70273, Oct. 23, 1980; CGD 81-059, 54 FR 151, Jan. 4, 1989]

§ 151.45-5 Open hopper barges.

(a) All open hopper barges not constructed or modified in conformance with the provisions of Subpart 151.10 of this part when carrying in bulk any cargoes regulated by this subchapter shall meet the provisions of this section. However, the provisions of this section are not applicable to such barges when empty (not necessarily cleaned or gas-freed).

(1) Except as otherwise provided in this section, no such open hopper type barge shall be placed as lead barge in any tow. These barges shall be placed in protected positions within the tow so that the danger from diving or swamping will be minimized. Where, due to operating conditions, compliance with this paragraph is impossible, the provisions of paragraph (a)(3) of this section apply. The person in charge of the towing vessel shall be responsible for compliance with this paragraph.

(2) No such open hopper type barge shall be moved from a loading facility unless all void spaces and bilges are substantially free of water. Periodic inspections and necessary pumping shall be carried out to insure the maintenance of such water-free conditions, in order to minimize the free surface effect in both the longitudinal and transverse directions. Except when considered necessary for inspection or pumping, all hatch covers and other hull closure devices for void spaces and hull compartments shall be closed and secured at all times. In the case of unmanned barges, the person in charge of the towing vessel shall be deemed to be in charge of the barge, and all requirements to be carried out on the barge shall be carried out by or under the direction of this person.

(3) When an open hopper type barge is in an exposed position, such that protection from swamping provided by adjoining barges cannot be obtained from the location within the tow, it shall be the responsibility of the person in charge of the towing vessel to control speed so as to insure protection against diving and swamping of the barge, having regard to its design and freeboard, and other operating conditions.

(b) To show that special operating requirements apply to a specific open hopper type barge, additional placards or signs shall be displayed in at least four different locations on the barge when the cargoes subject to this part are carried in any form in the cargo tanks. The placards or signs shall be posted on the barge approximately amidships on each side and near the centerline fore and aft facing outboard. Racks, or other suitable means for mounting such placards or signs, shall be so arranged as to provide clear visibility and shall be protected from becoming readily damaged or obscured. The placards or signs shall be at least equal in dimensions to the DOT standard tank car "Dangerous" placard (10¾ inches square or larger) and shall display a circle (10 inches in diameter or larger) with alternating quadrants of white and red, and so mounted that the red quadrants are centered on the vertical axis. The shipper and/or owner of the barge shall be responsible for the installation of the required placards or signs, including maintenance of them while such barge is in temporary storage with cargo aboard. The person in charge of the towing vessel shall be responsible for the continued maintenance of the placards or signs while such barge is in transit.

§ 151.45-6 Maximum amount of cargo.

(a) Tanks carrying liquids or liquefied gases at ambient temperatures regulated by this subchapter shall be limited in the amount of cargo loaded to that which will avoid the tank being liquid full at 105° F. if insulated, or 115° F. if uninsulated. If specific filling densities are designated in Subpart 151.50 of this part, they shall take precedence over that noted above.

(b) Refrigerated and semirefrigerated tanks shall be filled so that there is an outage of at least 2 percent of the volume of the tank at the temperature corresponding to the vapor pressure of the cargo at the safety relief valve setting. A reduction in the required outage may be permitted by the Commandant when warranted by special design considerations. Normally, then, the maximum volume to which a tank may be loaded is:

$$V_L = 0.98 d_r V \div d_L$$

where:

V_L = Maximum volume to which tank may be loaded.

V = Volume of tank.

d_r = Density of cargo at the temperature required for a cargo vapor pressure equal to the relief valve setting.

d_L = Density of cargo at the loading temperature and pressure.

§ 151.45-7 Shipping papers.

Each barge carrying dangerous cargo shall have on board a bill of lading, manifest, or shipping document giving the name of shipper, location of the loading point, and the kind, grade, and approximate quantity by compartment of each cargo in the barge. Such manifest or bills of lading may be made out by the shipper, master of the towing vessel, owner, or agent of the owner. However, in the case of unmanned barges the master of the towing vessel shall either have a copy of the shipping papers for each barge in his tow or he shall make an entry in the towing vessel's log book giving the name of the shipper, location where the barge was loaded, and the kind, grade, and quantity of cargo by compartment in the barge. The barge shall not be delayed in order to secure the exact quantities of cargo.

§ 151.45-8 Illness, alcohol, drugs.

A person who is under the influence of liquor or other stimulants, or is so ill as to render him unfit to perform service shall not be permitted to perform any duties on the barge.

§ 151.45-9 Signals.

While fast to a dock, a vessel during transfer of bulk cargo shall display a red flag by day or a red light by night, which signal shall be so placed that it will be visible on all sides. When at anchor, a vessel during transfer of bulk cargo shall display a red flag by day, placed so that it will be visible on all sides. This flag may be metallic.

Subpart 151.50—Special Requirements

§ 151.50-1 General.

Special requirements found in this subpart pertain to specific cargoes and to similar groups of cargoes. These requirements are in addition to and take precedence over any other requirements found in these regulations.

§ 151.50-5 Cargoes having toxic properties.

When table 151.05 refers to this section, the following apply:

(a) [Reserved]

(b) Independent tanks shall be designed and tested for a head of at least 8 feet above the top of the tank using the specific gravity of the product to be carried. In addition, tank design calculations shall demonstrate that the tank can withstand, without rupture, a single loading to the highest level to which the product may rise, if that exceeds 8 feet. In general, plate less than five-sixteenths inch in thickness shall not be used in the fabrication of independent tanks unless otherwise approved.

(c)(1) Cargo tanks transporting liquids having a Reid vapor pressure exceeding 14 pounds per square inch absolute or vented at a gauge pressure exceeding 4 pounds per square inch, or where air or water pressure is used to discharge the cargo, shall be fabricated as arc-welded unfired pressure vessels.

(2) Unfired pressure vessel cargo tanks shall be designed for a pressure not less than the vapor pressure, in pounds per square inch gauge, of the lading at 115° F., or the maximum air or water pressure used to discharge the cargo, whichever is greater, but in no case shall the design pressure of such tanks be less than 30 pounds per square inch gauge.

(d) *Piping.* (1) The pumps and piping used for cargo transfer shall be independent of all other piping.

(2) Where multiple cargoes are carried, and the cargo piping conveying cargoes covered under this section are led through cargo tanks containing other products, the piping shall be encased in a tunnel.

(3) Where cargo lines handling other products, or bilge and ballast piping are led through tanks containing cargoes covered by this section, the piping shall be enclosed in a tunnel.

(e) Gravity type cargo tanks shall be fitted with an approved pressure-vacuum relief valve of not less than 2½-inch size, which shall be set at a pressure of not less than 3 pounds per square inch gauge, but not in excess of the design pressure of the tank.

(f) The discharge fittings from each safety relief or pressure vacuum relief valve shall be directed in such a manner as to not impinge on another tank, piping or any other equipment which would increase the fire hazard should burning products be discharged from the safety or pressure vacuum relief valve as a result of a fire or other casualty. In addition, the discharges shall be directed away from areas where it is likely that persons might be working and as remote as practicable from ventilation inlets and ignition sources. A common discharge header may be employed if desired. The area near the discharge fittings shall be clearly marked as a hazardous area.

(g) A means shall be provided for either the reclamation or safe venting of vapors during the loading and unloading operations. For this purpose the safety relief or pressure vacuum relief valve shall be provided with a valved bypass to a vapor return line shore connection which shall be used whenever vapor return shore facilities are available. In the event vapors must be vented to the atmosphere, a vent riser shall extend at least 12 feet above the highest level accessible to personnel. The vent riser may be collapsible for ease of stowage when not in use. Vapor return lines or vent risers for tanks carrying the same class product may be connected to a common header system if desired. Tanks carrying cargoes covered by this section shall be vented independent of tanks carrying other products.

(h) The pump room ventilation outlet duct exhausts shall terminate at a distance of at least 6 feet above the enclosed space or pump room and at least 6 feet from any entrance to the interior part of the vessel. The discharge end of the exhaust ducts shall be located so as to preclude the possibility of recirculating contaminated air through the pump room, or other spaces where personnel may be present.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276 and 17277, Apr. 24, 1990]

§ 151.50-6 Motor fuel antiknock compounds.

When transporting motor fuel antiknock compounds containing tetraethyl lead and tetramethyl lead the requirements listed in this section shall be observed.

(a) Tanks used for these cargoes shall not be used for the transportation of any other cargo except those commodities to be used in the manufacture of tetraethyl lead and tetramethyl lead.

(b) Pump rooms shall be equipped with forced ventilation with complete air change every 2 minutes. Air analysis shall be run for lead content to determine if the atmosphere is satisfactory prior to personnel entering the pump room.

(c) Entry into cargo tanks used for the transportation of these cargoes is not permitted.

(d) No internal tank inspection is required. If it is desired to internally inspect tanks used for these cargoes, the Commandant must be notified in advance before such inspection is made.

(e) The provisions of § 151.50-5 shall also be met as a requirement for shipping antiknock compounds containing tetraethyl lead and tetramethyl lead.

§ 151.50-10 Alkylene oxides.

(a) For the purpose of this part, alkylene oxides are considered to be ethylene oxide and propylene oxide.

(b) Alkylene oxides transported under the provisions of this part shall be acetylene free.

(c)(1) No other product may be transported in tanks certified for an alkylene oxide except that the Commandant may approve subsequent transportation of other products and return to alkylene oxide service if tanks, piping and auxiliary equipment are adequately cleaned to the satisfaction of the Marine Inspector.

(2) Unless authorized by the Commandant, no other kind of cargo except methane, ethane, propane, butane and pentane shall be on board a tank vessel certificated for the carriage of an alkylene oxide at the same time an alkylene oxide in either the liquid or vapor state is present in any cargo tank. Alkylene oxide tanks shall not be installed in tanks intended for any other cargo.

(d) All valves, flanges, fittings, and accessory equipment shall be of a type suitable for use with the alkylene oxides and shall be made of steel or stainless steel, or other materials acceptable to the Commandant. Impurities of copper, magnesium and other acetylide-forming metals shall be kept to a minimum. The chemical composition of all material used shall be submitted to the Commandant for approval prior to fabrication. Disks or disk faces, seats and other wearing parts of valves shall be made of stainless steel containing not less than 11 percent chromium. Mercury, silver, aluminum, magnesium, copper, and their alloys shall not be used for any valves, gauges, thermometers, or any similar devices. Gaskets shall be constructed of spirally wound stainless steel with "Teflon" or other suitable material. All packing and gaskets shall be constructed of materials which do not react spontaneously with or lower the autoignition temperature of the alkylene oxides.

(e) The pressure rating of valves, fittings, and accessories shall be not less than the maximum pressure for which the cargo tank is designed, or the shutoff head of the cargo pump, whichever is greater, but in no case less than 150 pounds per square inch. Welded fittings manufactured in accordance with A.N.S.I. Standards shall be used wherever possible, and the number of pipe joints shall be held to a minimum. Threaded joints in the cargo liquid and vapor lines are prohibited.

(f) The thermometer shall terminate in the liquid space and shall be attached to the shell by welding with the end of the fitting being provided with a gastight screwed plug or bolted cover.

(g) Automatic float continuous reading tape gauge, and similar types, shall be fitted with a shutoff valve located as close to the tank as practicable, which shall be designed to close automatically in the event of fracture of the external gauge piping. An auxiliary gauging device shall always be used in conjunction with an automatic gauging device.

(h) Filling and discharge piping shall extend to within 4 inches of the bottom of the tank or sump pit if one is provided.

(i) *Venting.* (1) The discharge fittings from each safety relief or pressure vacuum relief valve shall be directed in such a manner as to not impinge on another tank, piping or any other equipment which would increase the fire hazard should burning products be discharged from the safety or pressure vacuum relief valve as a result of a fire or other casualty. In addition, the discharges shall be directed away from areas where it is likely that persons might be working and as remote as practicable from ventilation inlets and ignition sources. A common discharge header may be employed if desired. The area near the discharge fittings shall be clearly marked as a hazardous area.

(2) A means shall be provided for either the reclamation or safe venting of vapors during the loading and unloading operations. For this purpose, the safety relief or pressure vacuum relief valve shall be provided with a valved bypass to a vapor return line shore connection which shall be used whenever vapor return shore facilities are available. In the event vapors must be vented to the atmosphere, a vent riser shall be connected to the vapor return line and extend at least 12 feet above the highest level accessible to personnel. The vent riser may be collapsible for ease of stowage when not in use. The vent riser shall not be connected to a safety relief or pressure vacuum valve. Vapor return lines or vent risers for tanks carrying the same class product may be connected to a common header system if desired. Tanks carrying alkylene oxides shall be vented independent of tanks carrying other products.

(3) The outlet of each vent riser shall be fitted with acceptable corrosion-resistant flame screen of suitable material or a flame arrester suitable for use with alkylene oxide.

(j) *Ventilation.* (1) All enclosed spaces within the hull shall be vented or ventilated in accordance with the provisions of this subchapter except as otherwise provided for in this subpart.

(2) The enclosed spaces in which the cargo tanks are located shall be inerted by injection of a suitable inert gas or shall be well ventilated.

(3) The enclosed spaces in which the cargo tanks are located, if an inerting system is not installed, shall be fitted with forced ventilation of such capacity to provide a complete change of air every three minutes and arranged in such a manner that any vapors lost into the space will be removed. The ventilation system shall be in operation at all times cargo is being loaded or discharged. No electrical equipment shall be fitted within the spaces or within ten feet of the ventilation exhaust from these spaces.

(4) All ventilation machinery shall be of nonsparking construction and shall not provide a source of vapor ignition.

(5) Each vent shall be fitted with a flame screen of corrosion resistant wire which is suitable for use with the alkylene oxide.

(k)(1) Flexible metal hose fabricated of stainless steel or other acceptable material, resistant to the action of the alkylene oxide, shall be fitted to the liquid and vapor lines during cargo transfer.

(2) The hose shall be marked with the maximum pressure guaranteed by the manufacturer, and with his certification with the words "Certified for ———— Oxide."

(3) Cargo hose intended for alkylene oxide service shall not be used for any other products except those which are compatible with the alkylene oxide.

(l) Vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected and any spillage has been removed.

(m) Cargo shall be discharged by pumping or by displacement with nitrogen or other acceptable inert gas. In no case shall air be allowed to enter the system. During loading and unloading operations, the vapor shall not be discharged to the atmosphere. Provisions shall be made to return all displaced vapor to the loading facility. The loading rate and the pressure applied to the tank to discharge the cargo shall be so limited to prevent opening the safety relief valves.

(n) During cargo transfer, a water hose with pressure to the nozzle, when atmospheric temperatures permit, shall be connected to a water supply for immediate use during filling and discharge operations and any spillage of alkylene oxide shall be immediately washed away. This requirement can be met by facilities provided from shore.

(o) Prior to disconnecting shore lines, the pressure in the liquid and vapor lines shall be relieved through suitable valves installed at the loading header. The liquid and vapor discharged from these lines shall not be discharged to atmosphere.

(p) The safety relief valves shall be tested by liquid, gas, or vapor pressure at least once every 2 years to determine the accuracy of adjustment and, if necessary, shall be reset. Alkylene oxides shall not be used as the testing medium.

(q) The special requirements for ethylene oxide contained in § 151.50-12 and for propylene oxide contained in § 151.50-13 shall also be observed.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85-061, 54 FR 50966, Dec. 11, 1989]

§ 151.50-12 Ethylene oxide.

(a)(1) Ethylene oxide shall be carried in fixed, independent, pressure vessel type cargo tanks, designed, constructed, arranged and, if necessary, equipped with machinery to maintain the cargo temperature below 90° F. except as otherwise provided for in paragraph (a)(3) of this section.

(2) Ethylene oxide shall be loaded at a temperature below 70° F.

(3) When ethylene oxide is to be transported at or near atmospheric pressure, the Commandant may permit the use of alternate methods of storage which are consistent with the minimum requirements of this subpart.

(b)(1) All cargo tanks shall be constructed of a carbon steel or stainless steel acceptable to the Commandant. Impurities of copper, magnesium and other acetylide-forming metals shall be kept to a minimum. The chemical composition of all steel used shall be submitted to the Commandant for approval prior to fabrication. Aluminum, copper and other acetylide-forming metals, such as silver, mercury, magnesium, and their alloys shall not be used as materials of construction for tanks or equipment used in handling ethylene oxide.

(2) Cargo tanks shall meet the requirements of Class I pressure vessels.

(3) Cargo tanks shall be designed for the maximum pressure of vapor or gas used in discharging the cargo but in no case shall the design pressure of such tanks be less than 75 pounds per square inch gauge. The tank shell and heads shall not be less than $\frac{5}{16}$-inch thick.

(c)(1) Cargo tanks shall be located below deck in holds or enclosed spaces with the domes or trunks extended above the weather deck and terminating in the open. Provisions shall be made to maintain the watertightness of the deck by means of watertight seals around such domes or trunks. The holds or enclosed spaces, in which the ethylene oxide tanks are located shall not be used for any other purpose. However, in open hopper type barges of a suitable design approved for such service, the weatherdeck may not be required to be watertight.

(2) All cargo tanks shall be installed with the manhole openings and all tank connections located above the weatherdeck in the open.

(3) Tanks shall be electrically bonded to the hull.

(4) No welding of any kind shall be done on cargo tanks or supporting structure unless authorized by the Commandant.

(d) All cargo tanks, piping, valves, fittings, and similar equipment which may contain ethylene oxide in either the liquid or vapor phase, including the vent risers, shall be insulated. Flanges need not be covered, but if covered, a small opening shall be left at the bottom of the flange cover to detect leaks. Insulation shall be of an approved incombustible material suitable for use with ethylene oxide, which does not significantly lower the autoignition temperature and which does not react spontaneously with ethylene oxide. The insulation shall be of such thickness as to provide a thermal conductance of not more than 0.075 B.t.u.

per square foot per degree Fahrenheit differential in temperature per hour.

(e)(1) When cooling systems are installed to maintain the temperature of the liquid below 90° F., at least two complete cooling plants, automatically regulated by temperature variations within the tanks shall be provided; each to be complete with the necessary auxiliaries for proper operation. The control system shall also be capable of being manually operated. An alarm shall be provided to indicate malfunctioning of the temperature controls. The capacity of each cooling system shall be sufficient to maintain the temperature of the liquid cargo at or below the design temperature of the system.

(2) An alternate arrangement may consist of three cooling plants, any two of which shall be sufficient to maintain the temperature of the liquid cargo at or below the design temperature of the system.

(3) Cooling systems requiring compression of ethylene oxide are prohibited.

(f) In addition to the shutoff valve required, all tank connections larger than one-half inch inside pipe size, except safety relief valves and liquid level gauging devices, shall be fitted with either internal back pressure check valves or internal excess flow valves in conjunction with a quick closing stop valve operable from at least two remote locations. The quick closing stop valve shall be of the "fail safe" type acceptable to the Commandant and shall be equipped with a fusible plug designed to melt between 208° F. and 220° F., which will cause the quick closing valve to close automatically in case of fire. The quick closing valve shall be located as close to the tank as possible.

(g) Piping systems intended for ethylene oxide service shall not be used for any other product and shall be completely separate from all other systems. The piping system shall be designed so that no cross connections may be made either through accident or design.

(h) Each safety relief valve shall be set to start to discharge at not less than 75 pounds per square inch gauge, nor more than the design pressure of the tank.

(i) The filling density shall not exceed 83 percent.

(j)(1) The cargo shall be shipped under a suitable protective inerting gas system, such as nitrogen. When nitrogen gas is used, the gas inerting system shall be so designed that the vapor space above the liquid cargo will be filled and maintained with a gas mixture of not less than 45 percent nitrogen. Other gases proposed for inerting use may be given consideration by the Commandant. Original charging only of protective inerting gas at the loading facility is not considered adequate. A sufficient amount of spare inerting gas as approved by the Commandant shall be provided on the vessel in order to maintain the proper concentration of the gas in the event of normal leakage or other losses.

(2) Any inerting gas selected should be at least 98 percent pure and free of reactive materials, such as ammonia, hydrogen sulfide, sulfur compounds, and acetylene.

(k) Prior to loading, a sample from the cargo tank will be taken to insure that the pad gas will meet the requirements of paragraph (j) of this section and that the oxygen content of the vapor space will be not more than 2 percent maximum. If necessary, a sample will be taken after loading to insure the vapor space meets this requirement.

(l) The cargo piping shall be inspected and tested at least once in each 2 calendar years.

(m) In those cases where the cargo transfer hose used is not part of the barge's equipment, the person in charge of the transfer operation shall determine that the provisions of § 151.50-10(k) have been met before using this hose. A certificate of test, supplied by the transfer facility, will be considered as adequate for this determination.

(n) The provisions of § 151.50-10 shall be complied with as a requirement for shipping ethylene oxide.

(o) A hydrostatic test of 1½ times the design pressure shall be made on the cargo tanks at least once in each 4 years at the time the internal examination is made and at such other times as considered necessary by the Officer in Charge, Marine Inspection.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85-061, 54 FR 50966, Dec. 11, 1989]

§ 151.50-13 Propylene oxide.

(a) (1) Pressure vessel cargo tanks shall meet the requirements of Class II pressure vessels.

(2) Cargo tanks shall be designed for the maximum pressure expected to be encountered during loading, storing and discharging the cargo but in no case shall the design pressure of pressure vessel tanks be less than thirty (30) pounds per square inch gauge. The tank shell and heads shall not be less than $\frac{5}{16}$-inch thick.

(b) When propylene oxide is carried on board a vessel, piping systems in propylene oxide service shall not be used for any other product and shall be completely separate from all other systems. The piping system shall be designed so that no cross connection may be made through inadvertence.

(c) Each safety relief valve shall be set to start to discharge at not less than 30 pounds per square inch gauge, nor more than the design pressure of the tank.

(d) Filling density shall not exceed 80 percent.

(e)(1) The cargo shall be shipped under a suitable protective padding, such as nitrogen gas. Other gases proposed for use as padding may be given consideration by the Commandant. Original charging only of protective gas padding at the loading facility is not considered adequate. A sufficient amount of spare padding gas as approved by the Commandant shall be provided on the vessel in order to maintain the proper concentration of the gas in the event of normal leakage or other losses.

(2) Any padding gas selected should be at least 98 percent pure and free of reactive materials.

(f) Prior to loading, a sample from the cargo tank will be taken to insure that the pad gas will meet the requirements of paragraph (e) of this section and that the oxygen content of the vapor space will be not more than 2 percent maximum. If necessary, a sample will be taken after loading to insure the vapor space meets this requirement.

(g) The cargo piping shall be subjected to a hydrostatic test of 1½ times the maximum pressure to which they may be subjected in service.

(h) The Commandant may permit the transportation of propylene oxide in other than pressure vessel type tanks if it is shown to his satisfaction that a degree of safety is obtained consistent with the minimum requirements of this subpart.

(i) The provisions of § 151.50-10 shall be complied with as a requirement for shipping propylene oxide.

§ 151.50-20 Inorganic acids.

(a)(1) Gravity type cargo tanks shall be designed and tested to meet the rules of the American Bureau of Shipping for a head of water at least 8 feet above the tank top or the highest level the lading may rise, whichever is the greater. The plate thickness of any part of the tank shall not be less than three-eighths inch.

(2) Gravity tank vents.

(i) The outlet end of the gravity tank vent shall terminate above the weatherdeck, clear of all obstructions and away from any source of ignition.

(ii) The gravity tank vent shall terminate in a gooseneck bend and shall be fitted with a single flame screen or two fitted flame screens as described in § 151.03-25. No shutoff valve or frangible disk shall be fitted in the vent lines.

(b)(1) Pressure vessel type cargo tanks shall be independent of the vessel's structure and shall be designed for the maximum pressure to which they may be subjected when compressed air is used to discharge the cargo, but in no case shall the design pressure be less than that indicated as follows:

Hydrochloric Acid—50 pounds per square inch gauge.
Hydrofluorosilicic Acid—50 pounds per square inch gauge.
Phosphoric Acid—30 pounds per square inch gauge.
Sulfuric Acid—50 pounds per square inch gauge.

(2) Pressure vessel type cargo tanks shall be of welded construction meet-

ing the requirements for Class II or Class III given in Part 54 of this chapter.

(3) When compressed air is used to discharge the cargo, the tank shall be fitted with a vent led to the atmosphere in which a rupture disk shall be installed. The rupture disk shall be designed to burst at a pressure not exceeding the design pressure of the tank. An auxiliary vent to relieve the pressure or vacuum in the tank during the cargo transfer operation may be led from the vent line between the tank and the rupture disk. A shutoff valve may be fitted in the auxiliary vent.

(c) Openings in tanks are prohibited below deck, except for access openings used for inspection and maintenance of tanks, or unless otherwise specifically approved by the Commandant. Openings shall be fitted with bolted cover plates and acid-resistant gaskets.

(d) Where special arrangements are approved by the Commandant to permit a pump suction to be led from the bottom of the tank, the filling and discharge lines shall be fitted with shutoff valves located above the weatherdeck or operable therefrom.

(e) The outage shall not be less than 1 percent.

(f) All enclosed compartments containing cargo tanks and all machinery spaces containing cargo pumps shall be fitted with effective means of ventilation.

(g) A separator shall be fitted in compressed air lines to the tank when air pressure is used to discharge the cargo.

(h) Only installed electric or portable battery lights shall be used during the cargo transfer operations. Smoking is prohibited and the person in charge of cargo transfer shall post No Smoking signs during cargo transfer operations.

(i) Tanks approved for the transportation of acid cargoes subject to this section shall not be used for the transportation of any other commodity, except upon authorization by the Commandant (G-MTH).

(j) Each cargo tank shall be subjected to an internal examination at least once in every 4 years. If cargo tank lining is required and the lining of the cargo tank has deteriorated in service or is not in place, the Marine Inspector may require the tank to be tested by such nondestructive means as he may consider necessary to determine its condition.

(k) The special requirements for hydrochloric acid in § 151.50-22, for hydroflurosilicic acid in § 151.50-77, for phosphoric acid in § 151.50-23, and for sulfuric acid in § 151.50-21 also apply to the carriage of those acids.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by GGD 80-001, 46 FR 63279, Dec. 31, 1981; CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-21 Sulfuric acid.

(a) *How sulfuric acid may be carried.* (1) Sulfuric acid of concentration of 77.5 percent (1.7019 specific gravity) (59.8° Baumé) or greater concentrations with or without an inhibitor, provided the corrosive effect on steel measured at 100° F. is not greater than that of 66° Baumé commercial sulfuric acid, may be transported in unlined gravity type cargo tanks or unlined pressure vessel type cargo tanks.

(2) Sulfuric acid of concentration of 65.25 percent (1.559 specific gravity) (52° Baumé) or greater concentrations, provided the corrosive effect on steel measured at 100° F. is not greater than that of 52° Baumé commercial sulfuric acid, may be transported in unlined pressure vessel type cargo tanks independent of the vessel's structure.

(3) Sulfuric acid of concentration not to exceed 65.25 percent (1.559 specific gravity) (52° Baumé) may be transported in gravity type cargo tanks or pressure-vessel type cargo tanks which are lined with lead or other equally suitable acid-resistant material acceptable to the Commandant.

(4) Sulfuric acid of concentration not to exceed 51 percent (1.408 specific gravity) (42° Baumé) and spent sulfuric acid resulting from the use of sulfuric acid in industrial processes may be transported in gravity type cargo tanks which are lined with rubber or other equally suitable acid-resistant material acceptable to the Commandant. See § 151.15-3(f)(2).

(5) Spent or sludge sulfuric acid resulting from the use of sulfuric acid in industrial processes may be transported in unlined gravity type cargo tanks or unlined pressure vessel type cargo tanks, provided the corrosive effect on steel is not greater than that of commercial sulfuric acid as prescribed in paragraph (a)(1) of this section.

(b) Heating coils will be the only acceptable means of liquefying frozen or congealed sulfuric acid.

(c) During cargo transfer, a water hose shall be connected to a water supply ready for immediate use and any leakage or spillage of acid shall be immediately washed down. This requirement can be met by facilities provided from shore.

(d) The requirements of § 151.50-20 are also applicable to the shipment of sulfuric acid.

§ 151.50-22 Hydrochloric acid.

(a) Hydrochloric acid shall be carried in gravity or pressure type cargo tanks which are independent of the vessel's structure provided such tanks are lined with rubber or other equally suitable material acceptable to the Commandant. See § 151.15-3(f)(2).

(b) Notwithstanding the provisions of § 151.50-20(b)(3), compressed air may be used to discharge hydrochloric acid from gravity type cargo tanks only if the tanks are of cylindrical shape with dished heads, provided the air pressure does not exceed the design pressure of the tank but in no case shall it exceed 10 pounds per square inch gauge. Such tanks shall be fitted with pressure relief devices and need not be vented to the atmosphere as required by § 151.50-20(b)(3).

(c) During cargo transfer, a water hose shall be connected to a water supply and be ready for immediate use. Any leakage or spillage of acid shall be immediately washed down. This requirement can be met by facilities provided from shore.

(d) Spent hydrochloric acid or hydrochloric acid adulterated by other chemicals, inhibitors, oils, solvents, water, etc., shall not be transported in bulk except upon authorization by the Commandant (G-MTH).

(e) The requirements of § 151.50-20 are also applicable to the shipment of hydrochloric acid.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-23 Phosphoric acid.

(a) The term "phosphoric acid" as used in this subpart shall include, in addition to phosphoric acid, aqueous solutions of phosphoric acid, and super phosphoric acid.

(b) Phosphoric acid may be carried in either gravity or pressure type cargo tanks. The tanks shall be rubber-lined, or lined or clad with other suitable material acceptable to the Commandant, or shall be fabricated of a phosphoric acid resistant stainless steel. See § 151.15-3(f)(2).

(c) The vessel's shell plating shall not be used as any part of the boundaries of gravity type cargo tanks.

(d) Cargo piping, including valves, fittings, and flanges where exposed to the acid, shall be rubber-lined, or lined, coated or clad with other corrosion-resistant material, or shall be fabricated of a phosphoric acid resistant stainless steel. Vent piping, including flanges and fittings, shall be similarly protected at least to the height of the flangible disk if such is installed.

(e) Phosphoric acid adulterated by other chemicals, inhibitors, oils, solvents, etc., shall not be transported in bulk cargo tanks except upon authorization by the Commandant (G-MTH).

(f) The requirements of § 151.50-20 are also applicable to the shipment of phosphoric acid.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 151.50-30 Compressed gases.

(a) All tank inlet and outlet connections, except safety relief valves, liquid level gauging devices, and pressure gauges shall be marked to designate whether they terminate in the vapor or liquid space. Labels, when used, shall be of corrosion-resistant materials and may be attached to valves.

(b) *Venting.* (1) Except as provided in paragraph (b)(2) of this section each safety relief valve installed on a cargo tank shall be connected to a branch vent of a venting system which shall be constructed so that the discharge of gas will be directed vertically upward to a point at least 10 feet above the weatherdeck or the top of any tank or house located above the weatherdeck.

(2) Safety valves on cargo tanks in barges may be connected to individual or common risers which shall extend to a reasonable height above the deck. Where the escape of vapors from the venting system may interfere with towing operations, the installation shall be acceptable to the Commandant, and the arrangement shall be such as to minimize the hazard of escaping vapors. Arrangements specially provided for venting cargo tanks forming part of the hull on unmanned barges will be given special consideration by the Commandant.

(3) The capacity of branch vents or vent headers shall depend upon the number of cargo tanks connected to such branch or header as provided in Table 151.50-30(b)(3).

TABLE 151.50-30(b)(3)—CAPACITY OF BRANCH VENTS OR VENT HEADERS

Number of cargo tanks	*Percent of total valve discharge*
1 or 2	100
3	90
4	80
5	70
6 or more	60

(4) Return bends and restrictive pipe fittings are prohibited. Vents and headers shall be so installed as to minimize stresses on safety relief valves and their mounting nozzles.

(5) When vent discharge risers are installed, they shall be so located as to protect against physical damage and be fitted with loose raincaps.

(6) When vent discharge risers are installed and their installation in accordance with the provisions of this paragraph results in restrictions in the operation of the barge due to navigation clearances, the vents may be designed so as to be collapsible when passing under such low clearance obstacles.

(c) *Repairs involving welding or burning.* (1) Repairs involving welding or burning shall not be undertaken on the cargo tanks or piping while cargo in either the liquid or vapor state is present therein.

(2) Repairs involving welding or burning on parts of the barge other than cargo tanks or piping may be undertaken provided positive pressure is maintained in the tanks or the tanks have been vented or washed internally.

(d) *Respiratory equipment.* (1) At least one approved self-contained breathing apparatus shall be available in a readily accessible location off the barge at all times during the cargo transfer operations. This equipment shall not be considered to be part of the barge equipment, and the barge shall not be required to carry this equipment en route.

(2) The approved self-contained breathing apparatus, masks, and all respiratory protective devices shall be of types suitable for starting and operating at the temperatures encountered, and shall be maintained in good operating condition.

(3) Personnel involved in the cargo transfer operations shall be adequately trained in the use of the respiratory equipment.

(e) *Filling densities and container design pressure.* For compressed gases transported at or near ambient temperatures, the maximum filling densities and minimum design pressure of container as indicated in Table 151.50-30(e) shall apply. Deviations from the tabulated values shall be submitted to the Commandant for approval. Where cargo is to be carried at temperatures below ambient, the tank shall be designed in accordance with § 151.15-3(b)(3) and the maximum amount of cargo shall be in accordance with § 151.45-6(b).

TABLE 151.50-30(e)—FILLING DENSITIES AND CONTAINER DESIGN PRESSURES

Kind of gas	Maximum permitted filling density (percent by weight, see § 151.03-21)		Minimum design pressure of tank (pounds per square inch gauge)	
	Uninsulated tanks	Insulated tanks	Uninsulated tanks	Insulated tanks
Ammonia, anhydrous	57	58	250	215
Chlorine	125	125	300	300
Dichlorodifluoromethane	123	125	147	127
Dimethylamine	61	62	46	36
Methyl chloride	85	87	131	112
Monochlorodifluoromethane	110	113	243	211
Vinyl chloride	86	87	81	67

(f) The shell and head thickness of liquefied compressed cargo tanks shall not be less than five-sixteenths inch.

(g) The special requirements for ammonia (anhydrous) in § 151.50-32, for argon in § 151.50-36, for chlorine in § 151.50-31, for nitrogen in § 151.50-36, and for vinyl chloride in § 151.50-34 also apply to the carriage of those gases.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-31 Chlorine.

(a) *Chlorine barges.* Subparts 98.03 and 98.20 of Part 98 of this chapter have been revoked. However, chlorine barges that were certified in accordance with the requirements of Subpart 98.20 of Part 98 of this chapter and having hulls modified, if necessary, to comply with §§ 98.03-5(c) and 98.03-25(c) of this chapter, shall be considered as complying with this part.

(b) *Design and construction of cargo tanks.* (1) The cargo tanks shall meet the requirements of Class I pressure vessels.

(2) Tanks shall be designed for a pressure of not less than 300 pounds per square inch gauge. For the maximum allowable working pressure of tanks in service, see paragraph (q) of this section.

(3) Each tank shall be provided with one or more 24-inch inside diameter manhole, fitted with a cover located above the maximum liquid level and as close as possible to the top of the tank. There shall be no other openings in the tank.

(c) Tanks may be installed "on deck" or "under deck" with the tank protruding above deck. If a portion of the tank extends above the weatherdeck, provision shall be made to maintain the weathertightness on the deck. All tanks shall be installed with the manhole opening located above the weatherdeck. Hopper type barges operating on protected inland waters may have tanks located in the hopper space.

(d) All valves, flanges, fittings and accessary equipment shall be of a type suitable for use with chlorine and shall be made of metal, corrosion-resistant to chlorine in either the gas or liquid phase. Cast or malleable iron shall not be used. Valves, flanges, and flanged joints shall be 300 pounds A.N.S.I. standard minimum with tongue and groove or raised face. Joints shall be fitted with sheet lead or other suitable gasket material. Welded fittings shall be used wherever possible and the number of pipe joints held to a minimum. Threaded joints in cargo lines and vapor lines shall not be used in sizes above 1 inch internal diameter. Welded "hammerlock" unions or other unions approved by the Commandant may be used at terminal points of fixed barge piping.

(e) Each tank shall be provided with liquid and vapor connections fitted with manually operated shutoff valves and with safety relief valves. All valves shall be bolted to the cover or covers specified in paragraph (b)(3) of this section and shall be protected against mechanical damage by a suitable protective metal housing. A drain connection shall be provided from the protective housing.

(f) All liquid and vapor connections except safety relief valves, shall be fitted with automatic excess flow valves, which shall be located on the inside of the tank. Bypass openings are not permitted in excess flow valves.

(g) Chlorine barge cargo piping shall not be fitted with the nonreturn valves specified by § 151.20-20(b).

(h) Liquid level gauging devices of any type are prohibited on chlorine tanks.

(i) A pressure gauge shall be attached to the vapor shutoff valve or vapor line so as to indicate the pressure in the tank at all times during loading and unloading.

(j) Piping including connections between tank valves and fixed barge piping, shall be of a thickness of not less than Schedule 80.

(k) In multiple tank installations the tanks shall not be interconnected by piping or manifolds which may contain liquid chlorine. Manifolding of vapor lines of individual tanks into a common header for connection to shore is permitted. More than one cargo tank may be filled or discharged at a time, provided each tank is filled from or discharged to shore tanks through separate lines.

(l) Connections between fixed barge piping and shore piping shall be fabricated from one of the following:

(1) Schedule 80 seamless pipe, having flexible metallic joints.

(2) Corrosion-resistant metallic pipe (equivalent to Schedule 80) not subject to deterioration by chlorine, having flexible metallic joints.

(3) Flexible metallic hose acceptable to the Commandant. If paragraphs (k)(1) or (2) of this section are used, the flexible metallic joints shall meet the requirements for cargo hose. See § 151.04-5(h).

(m) Safety relief valves shall discharge into the protective housing surrounding the valves. Suitable provisions shall be made to vent the housing. The arrangement shall be such as to minimize the hazard of escaping vapors.

(n) *Cargo transfer operations.* (1) The amount of chlorine loaded into each cargo tank shall be determined by weight. Draft marks shall not be used as a means of weighing. Any chlorine vapors vented during the filling operation shall be disregarded when calculating the maximum amount of chlorine to be loaded into the cargo tanks.

(2) Prior to the start of filling operations, care shall be exercised to insure that the cargo tanks are empty, dry, and free from foreign matter.

(3) After the filling operation is completed, the vapor in each cargo tank shall be analyzed to determine the percentage of gaseous chlorine in the vapor space. If it should contain less than 80 percent chlorine by volume, vapors shall be withdrawn through the vent or vapor line until the vapor in the cargo tanks contains at least 80 percent chlorine by volume.

(4) After filling connections are removed, upon completion of the loading of a cargo tank, all connections at the tank shall be tested for leakage of chlorine by the aqua ammonia method.

(5) The chlorine in the cargo tanks shall be discharged by the pressure differential method. If the vapor pressure of the chlorine is not sufficient to force the liquid out of the tank, compressed air, or other nonreactive gas, may be used to secure the desired rate of discharge, provided the air or gas is oil-free and thoroughly dried by passing it over activated aluminum oxide, silica gel, or other acceptable drying agent, and provided the supply pressure is limited to 75 percent of maximum allowable pressure of chlorine tanks.

(6) After completion of cargo transfer, any liquid chlorine in the cargo piping shall be removed and cargo transfer piping shall be disconnected at the cargo tanks. After disconnecting the cargo piping, both ends of the line shall be closed and all inlet and outlet valves on the tank shall be plugged or fitted with blind flanges.

(o) During cargo transfer, every person on the barge shall carry on his person a respiratory protective device which will protect the wearer against chlorine vapors and will provide respiratory protection for emergency escape from a contaminated area resulting from cargo leakage. This respiratory protective equipment shall be of such size and weight that the person wearing it will not be restricted in movement or in the wearing of a lifesaving device.

(p) During each internal inspection, each cargo tank must be tested hydrostatically to 1½ times the maximum allowable pressure as determined by the safety relief valve setting.

(q) When periodic inspection indicates that a cargo tank has deteriorated in service, the maximum allowable pressure shall be recalculated, using the minimum thickness found by actual measurement. The recalculated maximum allowable pressure shall be not less than 275 pounds per square inch gauge. If the recalculated maximum allowable pressure is less than 275 pounds per square inch gauge, the cargo tanks shall be withdrawn from service.

(r) The following substances shall not be carried as stores on board barges transporting chlorine in bulk: hydrogen, methane, liquefied petroleum gases, coal gas, acetylene, ammonia, turpentine, compounds containing metallic powders, finely divided metals or finely divided organic materials.

(s) The requirements of § 151.50-30 for compressed gases are also applicable to the shipment of chlorine.

[CGFR 70—10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85-061, 54 FR 50966, Dec. 11, 1989]

§ 151.50-32 Ammonia, anhydrous.

(a) The anhydrous ammonia tanks may be installed in the bulk liquid cargo tanks provided the liquid surrounding the enclosed anhydrous ammonia tanks complies with the following chemical and physical properties:

(1) Boiling point above 125° F. atmospheric pressure.

(2) Inert to ammonia at 100° F. at atmospheric pressure.

(3) Noncorrosive in the liquid and vapor phase to the ammonia tanks and piping.

(b) Copper, copper alloys, and copper bearing alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with anhydrous ammonia liquid or vapor.

(c) Valves, flanges and pipe fittings shall be of the tongue and groove or raised-face type, fitted with suitable gasket material. Welded fittings shall be used wherever possible and the number of pipe joints shall be held to a minimum. Threaded joints are not permitted for pipe diameters exceeding 2 inches. Brazed joints are prohibited.

(d) All enclosed spaces containing cargo tanks fitted with bottom outlet connections shall be provided with mechanical ventilation of sufficient capacity to assure a change of air every 3 minutes.

(e) Each cargo tank shall be electrically grounded to the hull.

(f) When transferring cargo, a hose shall be connected to a water supply so that if leakage of anhydrous ammonia occurs the vapor may be dispersed by the use of water fog. This requirement can be met by facilities provided from shore.

(g) During cargo transfer operations, every person on the vessel shall carry on his person or have close at hand at all times a canister mask approved for ammonia or each person shall carry on his person a respiratory protective device which will protect the wearer against ammonia vapors and will provide respiratory protection for emergency escape from a contaminated area resulting from cargo leakage. This respiratory protective equipment shall be of such size and weight that the person wearing it will not be restricted in movement or in the wearing of a lifesaving device.

(h) [Reserved]

(i) The requirements of § 151.50-30 for compressed gases are also applicable to the shipment of anhydrous ammonia.

[CGFR 70—10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85-061, 54 FR 50966, Dec. 11, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-34 Vinyl chloride (vinyl chloride monomer).

(a) Copper, aluminum, magnesium, mercury, silver, and their alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with vinyl chloride liquid or vapor.

(b) Valves, flanges, and pipe fittings shall be of the tongue and groove or raised-face type, fitted with suitable gasket material. Welded fittings shall be used wherever possible and the number of pipe joints shall be held to a minimum. Threaded joints are not permitted for pipe diameters exceeding 2 inches. Brazed joints are prohibited.

(c) Each cargo tank shall be electrically grounded to the hull.

(d) The vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected and any spillage has been removed.

(e) To the extent he deems it necessary, the Officer in Charge, Marine Inspection, may require that sufficient insulation shall be removed from insulated tanks at least once in each 8 calendar years to permit spot external examination of the tanks and insulation in accordance with § 151.04-5(c).

(f) The requirements of § 151.50-30 for compressed gases are also applicable to the shipment of vinyl chloride.

(g) The person in charge of cargo transfer shall ensure that:

(1) Cargo vapors are returned to the cargo tank or shore disposition for reclamation or destruction during cargo transfer operations;

(2) Continuous monitoring for vinyl chloride vapor leaks is conducted aboard a tank barge undergoing vinyl chloride transfer operations. Fixed or portable instrumentation may be utilized to ensure that personnel are not exposed to vinyl chloride vapor concentrations in excess of 1 ppm averaged over any eight hour period of 5 ppm averaged over any period not exceeding 15 minutes. The method of monitoring and measurement shall have an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50 percent from 0.25 through 0.5 ppm, plus or minus 35 percent from over 0.5 ppm through 1.0 ppm, and plus or minus 25 percent over 1.0 ppm;

(3) Cargo transfer operation is discontinued or corrective action is initiated by the person in charge to minimize exposure to personnel whenever a vinyl chloride vapor concentration in excess of 1 ppm is detected. If the vinyl chloride vapor concentration exceeds 5 ppm for over 15 minutes, action to reduce the leak can be continued only if the respiratory protection requirements of 29 CFR 1910.1017 are met by all personnel in the area of the leak;

(4) Those portions of cargo lines which will be open to the atmosphere after piping is disconnected are free of vinyl chloride liquid and that the vinyl chloride vapor concentration in the area of the cargo piping disconnect points is not greater than 5 ppm;

(5) Any restricted gauge fitted on a tank containing vinyl chloride is effectively out of service by locking or sealing the device so that it cannot be used; and

(6) A restricted gauge is not to be used as a "check" on the required closed gauge, nor as a means or sampling.

(h) The words "CANCER—SUSPECT AGENT" must be added to the warning signs required by 46 CFR 151.45-2(e).

(i) Signs bearing the legend:

CANCER—SUSPECT AGENT IN THIS AREA

PROTECTIVE EQUIPMENT REQUIRED

AUTHORIZED PERSONNEL ONLY

must be posted whenever hazardous operations, such as tank cleaning, are in progress.

(j) A tank barge undergoing cargo transfer operations must be designated a "regulated area" having access limited to authorized persons and requiring a daily roster of authorized persons who may board the barge.

(k) Employees engaged in hazardous operations, such as tank cleaning, must be provided, and be required to wear and use respiratory protection in accordance with the provisions of 29 CFR 1910.1017 and protective garments, provided clean and dry for each use, to prevent skin contact with liquid vinyl chloride.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 74-167R, 40 FR 17026, Apr. 16, 1975; CGD 88-100, 54 FR 40040, Sept. 29, 1989]

§ 151.50-36 Argon or nitrogen.

(a) A cargo tank that contains argon or nitrogen and that has a maximum allowable working pressure of 172 kPa (25 psig) or greater must have one of the following arrangements:

(1) A refrigeration system that keeps the tank pressure below the safety relief valve operating pressure when ambient temperatures are 46°C (115°F) air and 32°C (90°F) water.

(2) A relief valve or pressure control valve that maintains the tank pressure below the setting of the tank's required safety relief valve in ambient temperatures of 46°C (115°F) air and 32°C (90°F) water.

(b) A cargo tank with a maximum allowable working pressure of less than 172 kPa (25 psig) is approved by the Commandant (G-MTH) on a case by case basis.

(c) Section 151.50-30 also applies to the carriage of argon or nitrogen.

[CGD 88-100, 54 FR 40040, Sept. 29, 1989 as amended by 55 FR 17276, Apr. 24, 1990]

§ 151.50-40 Additional requirements for carbon disulfide (carbon bisulfide) and ethyl ether.

(a) The provisions of this section are applicable if specifically referenced in the Special Requirements column of Table 151.05.

(b) Cargo tanks shall be electrically bonded to the hull of the vessel. A vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected and any spillage has been removed.

(c) Pumps may be used for discharging cargo: *Provided*, That they are the vertical submerged type designed to avoid liquid pressure against the shaft gland and are suitable for use with the cargo.

(d) Provisions shall be made to maintain an inert gas padding in the cargo tank during loading, unloading and during transit.

(e) Provisions shall be made to prevent any leakage being washed into the waterways at the loading and unloading points.

(f) The special requirements of § 151.50-41 for carbon disulfide (*carbon bisulfide*) and § 151.50-42 for ethyl ether shall also be observed.

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40029, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-41 Carbon disulfide (carbon bisulfide).

(a) All openings shall be in the top of the tank.

(b) Loading lines shall terminate near the bottom of the tank.

(c) A standard ullage opening shall be provided for secondary and emergency sounding.

(d) If a cargo discharge pump is used, it shall be inserted through a cylindrical well extending from the tank top to a point near the tank bottom. A blanket of water shall be formed in this well before attempting pump removal.

(e) Water or inert gas displacement may be used for discharging cargo provided the cargo system is designed for the expected pressure and temperature. This method for discharging may be used with pressure type tanks only.

(f) Adequate natural ventilation shall be provided for the voids around the cargo tanks while the vessel is under way. During loading and unloading, forced ventilation shall be used. The forced ventilation shall be of sufficient capacity to provide a complete change of air within each void space every 5 minutes. The ventilating fan shall be of nonsparking construction.

(g) Because of its low ignition temperature and the close clearances required to arrest its flame propagation, carbon disulfide (*carbon bisulfide*) requires safeguards beyond those required for any electrical hazard groups.

(h) The requirements of § 151.50-40 are also applicable to the shipment of carbon disulfide (*carbon bisulfide*).

[CFGR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-42 Ethyl ether.

(a)(1) Gravity tanks shall be designed and tested to meet the rules of the American Bureau of Shipping for a head of water at least 8 feet above the tank top or the highest level the lading may rise, whichever is greater. All openings shall be in the top of the tank.

(2) Pressure vessel type tanks shall be designed for the maximum pressure to which they may be subjected when pressure is used to discharge the cargo, but in no case shall the design pressure be less than 50 pounds per square inch gauge. All openings shall be in the top of the tank.

(b) Adequate natural ventilation shall be provided for the voids around the cargo tanks while the vessel is underway. If a power ventilation system is installed, all blowers shall be of nonsparking construction. Power driven ventilation equipment shall not be located in the void spaces surrounding the cargo tanks.

(c) Pressure relief valve settings shall not be less than 3 pounds per square inch gauge for gravity tanks. For pressure vessels, the relief valve setting shall not exceed the design pressure of the tank.

(d) Inert gas displacement may be used for discharging cargo from pressure vessel tanks provided the cargo system is designed for the expected pressure and the discharge pressure does not exceed 50 pounds per square inch gauge or the design pressure of the tank, whichever is less.

(e) No electrical equipment except for approved lighting fixtures shall be installed in enclosed spaces adjacent to the cargo tanks. Lighting fixtures must be approved for use in Class I, Group C, hazardous locations. The installation of electrical equipment on the weather deck shall comply with the requirements of part 111, subpart 111.105 of this chapter.

(f) Copper, silver, mercury and magnesium or other acetylide forming metals and their alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings and other items of equipment that may come in contact with the cargo vapor or liquid.

(g) Precautions shall be taken to prevent the contamination of ethyl ether by strong oxidizing agents.

(h) The requirements of § 151.50-40 are also applicable to the shipment of ethyl ether.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88-100, 54 FR 40040, Sept. 29, 1989]

§ 151.50-50 Elemental phosphorus in water.

(a) Tanks shall be designed and tested for a head equivalent to the design lading of phosphorus and its water blanket extended to 8 feet above the tank top. In addition, tank design calculations shall demonstrate that the tank can withstand, without rupture, a single loading to the highest level to which the water blanket may rise, if that exceeds 8 feet. Tanks shall not be less than 5/16-inch thick.

(b) When a water displacement method of discharge is used, pressure vessel type cargo tanks, designed and tested in accordance with Subchapter F of this chapter shall be employed. Such tanks shall be designed for the maximum pressure to which they may be subjected when water pressure is used to discharge the cargo.

(c) Each cargo tank shall be fitted with an approved pressure vacuum relief valve set to discharge at a pressure not exceeding 2 pounds per square inch. When transferring cargo, the vent discharge shall lead overboard above the waterline. When pressure vessel type tanks are used, each tank shall be fitted with a relief valve of suitable size.

(d) Sufficient outage shall be provided to prevent the tank from being liquid full at any time, but in no case shall the outage be less than 1 percent. When pressure vessel type tanks are used, outage need not be provided.

(e) The use of compressed air to discharge cargo is prohibited.

(f) Cargo shall be loaded at a temperature not exceeding 140° F., and then cooled until the water above the cargo has a temperature not exceeding 105° F. prior to the movement of the vessel. Upon presentation of satisfactory proof that procedures followed will provide adequate safety in transportation and handling, the Commandant may authorize movement of the vessel following cooling of the water above the cargo to a temperature exceeding 105° F.

(g) Coils in which steam or hot water is circulated to heat the cargo so that it may be pumped shall be located outside the cargo tanks.

(h) A fixed ballast piping system (including a power driven pump of ample capacity), or other means acceptable to the Commandant shall be installed so that any void space surrounding the tanks may be flooded.

(i) All openings shall be in the top of the tank and shall be fitted with bolted cover plates and gaskets resistant to the attack of phosphorus pentoxide.

(j) All enclosed compartments containing cargo tanks shall be provided with effective means of ventilation.

(k) Cargo lines shall be traced with steam piping and secured thereto by lagging to prevent solidification of cargo during transfer operations.

(l) During cargo transfer, a water hose shall be connected to a water supply ready for immediate use, and any spillage of phosphorus shall be immediately washed down. This requirement can be met by facilities provided from shore.

(m) At least two fresh air masks or self-contained breathing apparatus shall be stowed on board the vessel at all times for use of personnel entering the tanks or adjacent spaces.

(n) Authorization from the Commandant (G-MTH) shall be obtained to transport lading other than phosphorus in the cargo tanks or to have on board any other cargo when phosphorus is laden in the tanks.

(o) Mechanical ventilation of sufficient capacity to insure a change of air within the cargo tanks every 3 minutes shall be provided during the inspection and maintenance of the cargo tanks.

(p) Cargo tanks shall be electrically bonded to the hull of the barge. A vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected.

[CGFR 70-10, 35 FR 3714, Feb. 24, 1970, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 151.50-55 Sulfur (molten).

(a) Ventilation (cargo tank):

(1) Cargo tank ventilation shall be provided to maintain the concentration of H_2S below one-half of its lower explosive limit throughout the cargo tank vapor space for all conditions of carriage; i.e., below 1.85 percent by volume.

(2) Where mechanical ventilation systems are used for maintaining low gas concentrations in cargo tanks, an alarm system shall be provided to give warning if the system fails.

(3) Connections shall be provided to enable sampling of the atmosphere over the cargo in each cargo tank for analysis.

(4) The ventilation system shall be designed and arranged to preclude the depositing of sulfur within the system.

(b) Void spaces:

(1) Openings to void spaces adjacent to cargo tanks shall be designed and fitted to prevent the entry of water, sulfur or cargo vapors.

(2) Connections shall be provided to enable sampling and analyzing vapors in void spaces.

(c) Temperature controls shall be provided in accordance with § 151.20-10 and applicable sections of Subpart 151.40 of this part. Heat transfer media shall be steam, and alternate media will require specific approval of the Commandant.

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970]

§ 151.50-60 Benzene.

The licensed officer, certificated tankerman or person in charge of a barge shall ensure that:

(a) No person on the barge is exposed to an airborne concentration of benzene in excess of:

(1) 10 parts per million (10 ppm) as an eight-hour time weighted average.

(2) Twenty-five parts per million (25 ppm) as a time-weighted average over any ten minute period;

(b) Personnel engaged in duties listed in 46 CFR 153.932(a) (1) through (5) don and use respirators meeting 29 CFR 1910.134 if the benzene exposure limits under paragraph (a) of this section are likely to be exceeded;

(c) The words:

BENZENE. CANCER HAZARD IN THIS AREA. PROTECTIVE EQUIPMENT MAY BE REQUIRED. AUTHORIZED PERSONNEL ONLY.

are on the warning signs required by § 151.45-2(e)(1).

[CGD 75-075, 44 FR 69300, Dec. 3, 1979]

§ 151.50-70 Cargoes requiring inhibition or stabilization.

When table 151.05 refers to this section, that cargo must be—

(a) Inhibited; or

(b) Stabilized.

[CGD 88-100, 54 FR 40040, Sept. 29, 1989, as amended by 55 FR 17276, Apr. 24, 1990]

§ 151.50-73 Chemical protective clothing.

When table 151.05 refers to this section, the following apply:

(a) The person in charge of cargo handling operations shall ensure that the following chemical protective clothing constructed of materials resistant to permeation by the cargo being handled is worn by all personnel engaged in an operation listed in paragraph (b) of this section:

(1) Splash protective eyewear.

(2) Long-sleeved gloves.

(3) Boots or shoe covers.

(4) Coveralls or lab aprons.

NOTE: "Guidelines for the Selection of Chemical Protective Clothing", Third Edition, 1987, available from the American Conference of Governmental Industrial Hygienists, 6500 Glenway Ave., Cincinnati, OH 45211-4438, provides information on the proper clothing for the cargo being handled.

(b) The section applies during the following operations:

(1) Sampling cargo.

(2) Transferring cargo.

(3) Making or breaking cargo hose connections.

(4) Gauging a cargo tank, unless gauging is by closed system.

(5) Opening cargo tanks.

(c) Coveralls or lab aprons may be replaced by splash suits or aprons constructed of light weight or disposable materials if, in the judgment of the person in charge of cargo handling operations,

(1) Contact with the cargo is likely to occur only infrequently and accidentally; and

(2) The splash suit or apron is disposed of immediately after contamination.

(d) Splash protective eyewear must be tight-fitting chemical-splash goggles, face shields, or similar items intended specifically for eye protection from chemical splashing or spraying.

(e) The person in charge of cargo handling operations shall ensure that each person in the vicinity of an operation listed in the paragraph (b) of this section or in the vicinity of tanks, piping, or pumps being used to transfer the cargo wears splash protective eyewear under paragraph (d) of this section.

[CGD 88-100, 54 FR 40040, Sept. 29, 1989, as amended by 55 FR 17276, Apr. 24, 1990]

§ 151.50-74 Ethylidene norbornene.

When Table 151.05 refers to this section, the following apply:

(a) 151.50-5 (g) and (h)

(b) Rubber hoses or fittings may not be used in transfer operations.

[CGD 80-001, 46 FR 63279, Dec. 31, 1981]

§ 151.50-75 Ferric chloride solution.

A containment system (cargo tank piping system, venting system, and gauging system) carrying this solution must be lined with rubber, corrosion resistant plastic, or a material approved by the Commandant (G-MTH).

[CGD 80-001, 46 FR 63279, Dec. 31, 1981, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 88-100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-76 Hydrochloric acid, spent (NTE 15%).

(a)(1) Gravity type cargo tanks must be designed and tested to meet the rules of the American Bureau of Shipping for a head of water at least 8 feet above the tank top or the highest level the lading may rise, whichever is greater. The plate thickness of any part of the tank may not be less than three-eighths inch. A shell plating of a barge may not be on the boundary of any part of the cargo tank.

(2) Gravity tank vents must:

(i) Terminate above the weatherdeck, clear of all obstructions and away from any from any source of ignition; and

(ii) Be fitted with a single flame screen or two fitted flame screens as described in § 151.03-25. Neither a shut-off valve nor a frangible disk may be fitted in the vent lines.

(b) Openings in the tanks are prohibited below deck, except for access openings used for inspection and maintenance of tanks, or unless otherwise specifically approved by the Commandant (G-MTH). Openings must be fitted with bolted cover plates and acid-resistant gaskets.

(c) Where special arrangements are approved by the Commandant (G-MTH) to permit a pump suction to be led from the bottom of the tank, the filling and discharge lines must be fitted with shutoff valves located above the weatherdeck or operable from it.

(d) The outage may not be less than 1 percent.

(e) An enclosed compartment containing, or a compartment adjacent to, a cargo tank:

(1) May have no electrical equipment that does not meet or exceed class I-B electrical requirements; and

(2) Must have at least one gooseneck vent of 2.5 inch diameter or greater. The structural arrangement of the compartment must provide for the free passage of air and gases to the vent or vents.

(f) No lights may be used during the cargo transfer operations, except installed electric or portable battery lights. Smoking is prohibited and the person in charge of cargo transfer shall ensure that "No Smoking" signs are displayed during cargo transfer operations.

(g) Tanks approved for the transportation of acid cargoes subject to this section may not be used for the transportation of any other commodity, except upon authorization by the Commandant (G-MTH).

(h) Each cargo tank must be examined internally at least once in every 4 years. If the lining of the cargo tank has deteriorated in service or is not in place, the Marine Inspector may require the tank to be tested by such nondestructive means as he may consider necessary to determine its condition.

[CGD 80-001, 46 FR 63279, Dec. 31, 1981, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 151.50-77 Hydrofluorosilicic acid (25% or less).

(a) Hydrofluorosilicic acid must be carried in gravity or pressure type cargo tanks independent of the vessel's structure. The tanks must be lined with rubber or other equally suitable material approved by the Commandant (G-MTH). See § 151.15-3(f)(2).

(b) Notwithstanding the provisions of § 151.50-20(b)(3), no compressed air may be used to discharge hydrofluorosilicic acid from gravity type cargo tanks unless:

(1) The tanks are of cylindrical shape with dished heads, and

(2) The air pressure does not exceed

(i) The design pressure of the tank and

(ii) 10 pounds per square inch gauge. The tanks must be fitted with pressure relief devices.

(c) During cargo tansfer, a water hose must be connected to a water supply and be ready for immediate use. Any leakage or spillage of acid must be immediately washed down. This requirement can be met by facilities provided from shore.

[CGD 80-001, 46 FR 63279, Dec. 31, 1981, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 151.50-79 Methyl acetylene-propadiene mixture.

(a) The composition of the methyl acetylene-propadiene mixture at loading must be within one of the following sets of composition limits:

(1) Composition 1 is:

(i) Maximum methyl acetylene to propadiene molar ratio of 3 to 1;

(ii) Maximum combined concentration of methyl acetylene and propadiene of 65 mole percent;

(iii) Minimum combined concentration of propane, butane, and isobutane of 24 mole percent, of which at least one-third (on a molar basis) must be butanes and one-third propane; and

(iv) Maximum combined concentration of propylene and butadiene of 10 mole percent.

(2) Composition 2 is:

(i) Maximum methyl acetylene and propadiene combined concentration of 30 mole percent;

(ii) Maximum methyl acetylene concentration of 20 mole percent;

(iii) Maximum propadiene concentration of 20 mole percent;

(iv) Maximum propylene concentration of 45 mole percent;

(v) Maximum butadiene and butylenes combined concentration of 2 mole percent;

(vi) Minimum saturated C_4 hydrocarbon concentration of 4 mole percent; and

(vii) Minimum propane concentration of 25 mole percent.

(b) A barge carrying a methyl acetylene-propadiene mixture must have a refrigeration system that does not compress the cargo vapor or have a refrigeration system with the following features:

(1) A vapor compressor that does not raise the temperature and pressure of the vapor above 60°C (140°F) and 1.72 MPa guage (250 psig) during its operations, and that does not allow vapor to stagnate in the compressor while it continues to run.

(2) At the discharge piping from each compressor stage or each cylinder in the same stage of a reciprocating compressor:

(i) Two temperature actuated shutdown switches set to operate at 60°C (140°F) or less;

(ii) A pressure actuated shutdown switch set to operate at 1.72 MPa gauge (250 psig) or less; and

(iii) A safety relief valve set to relieve at 1.77 MPa gauge (256 psig) or less anywhere except into the compressor suction line.

(c) The piping system, including the cargo refrigeration system, for tanks to be loaded with methyl acetylene-propadiene mixture must be completely separate from piping and refrigeration systems for other tanks. If the piping system for the tanks to be loaded with methyl acetylene-propadiene mixture is not independent, the required piping separation must be accomplished by the removal of spool pieces, valves or other pipe sections and the installation of blank flanges at these locations. The required separation applies to all liquid and vapor piping, liquid and vapor vent lines and any other possible connections, such as common inert gas supply lines.

[CGD 80-001, 46 FR 63279, Dec. 31, 1981]

§ 151.50-80 Nitric acid (70% or less).

(a) Tanks, cargo piping, valves, fittings, and flanges (where exposed to the acid) must be lined with nitric acid resistant rubber or fabricated from nitric acid resistant stainless steel. See § 151.15-3(f)(2).

(b) During cargo transfer, a water hose must be connected to a water supply, ready for immediate use. Any leakage or spillage of acid must be immediately washed down. This requirement can be met by facilities provided from shore.

(c) Nitric acid contaminated by other chemicals, oils, solvents, etc. may not be transported in bulk without an authorization from the Commandant (G-MTH).

[CGD 80-001, 46 FR 63280, Dec. 31, 1981, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 88-100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-81 Special operating requirements for heat sensitive cargoes.

When table 151.05 refers to this section, the following apply to the cargo:

(a) Must not be carried in a tank equipped with heating coils unless the heating supply to the coils is disconnected.

(b) Must not be carried in a tank adjacent to another tank containing an elevated temperature cargo.

(c) Must not be carried in a deck tank.

[CGD 80-001, 46 FR 63280, Dec. 31, 1981, as amended by CGD 88-100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-84 Sulfur dioxide.

(a) Sulfur dioxide that is transported under the provisions of this part may not contain more than 100 ppm of water.

(b) Cargo piping must be at least Schedule 40 pipe.

(c) Flanges must be 150 lb. A.N.S.I. Standard minimum with tongue and groove or raised face.

(d) A cargo tank must:

(1) Meet the requirements of a Class I welded pressure vessel;

(2) Be designed for a maximum allowable working pressure of at least 125 psig;

(3) Be hydrostatically tested every two years to at least 188 psig;

(4) Be provided with one or more manholes that are fitted with a cover sized not less than 15 inches by 23

inches or 13 inches nominal diameter, located above the maximum liquid level, and as close as possible to the top of the tank;

(5) Have no openings other than those required in paragraph (d)(4) of this section;

(6) Have no liquid level gauges other than closed or indirect gauges;

(7) Have all valves and the closed gauge that is required by Table 151.05 bolted to the cover or covers that are required in paragraph (d)(4) of this section;

(8) Have a metal housing that is fitted with a drain and vent connection protecting all valves and the closed gauge within this housing against mechanical damage;

(9) Have all safety relief valves discharging into the protective housing;

(10) Not be interconnected with another cargo tank by piping or manifold that carriers cargo liquid, except vapor lines connected to a common header, and

(11) Have an excess flow valve that is located on the inside of the tank for every liquid and vapor connection, except the safety relief valve;

(12) Have no bypass opening on any excess flow valve.

(e) Cargo transfer operations:

(1) May not be conducted with more than one cargo tank at a time unles each tank is filled from or discharged to shore tanks through separate lines;

(2) Must be conducted with connections between fixed barge piping and shore piping of either Schedule 40 pipe having flexible metallic joints that meet § 151.04-5(h) or of flexible metallic hose that is acceptable to the Commandant (G-MTH);

(3) From barge to shore must be by pressurization with an oil free, non-reactive gas that has a maximum of 100 ppm moisture;

(4) Must be conducted with vapor return to shore connections that ensure that all vapor is returned to shore; and

(5) Must be conducted with every person on the barge carrying a respiratory protective device that protects the wearer against sulfur dioxide vapors and provides respiratory protection for emergency escape from a contaminated area that results from cargo leakage.

(f) Respiratory protective equipment must be of a size and weight that allows unrestricted movement and wearing of a lifesaving device.

(g) After the completion of cargo transfer, all liquid sulfur dioxide in the cargo piping must be removed and cargo transfer piping must be disconnected at the cargo tanks. After the cargo piping is disconnected, both ends of the line must be plugged or fitted with blind flanges.

[CGD 80-001, 46 FR 63280, Dec. 31, 1981, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 88-100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50-86 Octyl nitrates.

(a) The carriage temperature of octyl nitrates must be maintained below 100 °C (212 °F) in order to prevent the occurrence of a self-sustaining exothermic decomposition reaction.

(b) Octyl nitrates may not be carried in a deck tank unless the tank has a combination of insulation and a water deluge system sufficient to maintain the tank's cargo temperature below 100 °C (212 °F) and the cargo temperature rise at or below 1.5 °C (2.7 °F)/hour, for a fire of 650 °C (1200 °F).

[CGD 88-100, 54 FR 40040, Sept. 29, 1989, as amended by 55 FR 17276, Apr. 24, 1990]

Subpart 151.55—Special Requirements for Materials of Construction

§ 151.55-1 General.

(a) This section provides special requirements for the materials of construction of equipment that may come into contact with various cargoes. Table 151.05 contains specific requirements for various cargoes.

(b) Copper, copper alloys, zinc, and aluminum shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to § 151.56-1(a),(b), and (c).)

(c) Copper, copper alloys, zinc, galvanized steel, and mercury shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to § 151.56-1(b),(c), and (g).)

(d) Aluminum, magnesium, zinc, and lithium shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to § 151.56-1(a),(c), and (d).)

(e) Copper and copper bearing alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to § 151.56-1(b).)

(f) Aluminum or copper or alloys of either shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo vapor or liquid. (Equivalent to § 151.56-1(a) and (b).)

(g) Aluminum, stainless steel, or steel covered with a suitable protective lining or coating shall be used as materials of construction for tanks, pipelines, valves fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to § 151.58-1(a).)

(h) Alkaline or acidic materials, such as caustic soda or sulfuric acid, should not be allowed to contaminate this cargo.

(i) For concentrations of 98 percent or greater, aluminum or stainless steel shall be used as materials of construction. For concentrations of less than 98 percent, 304L or 316 stainless steel shall be used as materials of construction.

(j) Zinc, alloys that have more than 10 percent zinc by weight, and aluminum may not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with cargo liquid or vapor. (Equivalent to § 151.56-1(a) and (c).)

[CGFR 70-10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 73-275R, 41 FR 3087, Jan. 21, 1976; CGD 75-223, 42 FR 8378, Feb. 10, 1977; CGD 88-100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

Subpart 151.56—Prohibited Materials of Construction

§ 151.56-1 Prohibited materials.

When one of the following paragraphs of this section is referenced in table 151.05, the materials listed in that paragraph may not be used in components that contact the cargo or its vapor:

(a) Aluminum or aluminum alloys.

(b) Copper or copper alloys.

(c) Zinc, galvanized steel, or alloys having more than 10 percent zinc by weight.

(d) Magnesium.

(e) Lead.

(f) Silver or silver alloys.

(g) Mercury.

[CGD 88-100, 54 FR 40041, Sept. 29, 1989, as amended by 55 FR 17276, Apr. 24, 1990]

Subpart 151.58—Required Materials of Construction

§ 151.58-1 Required materials.

When one of the following paragraphs of this section is referenced in table 151.05, only those materials listed in that paragraph may be used in components that contact the cargo or its vapor:

(a) Aluminum, stainless steel, or steel covered with a protective lining or coating. (See § 151.15-3(f)(2).)

(b)-(c) [Reserved]

(d) Solid austenitic stainless steel.

(e) Stainless steel or steel covered with a suitable protective lining or coating. (See § 151.15-3(f)(2).)

[CGD 88-100, 54 FR 40041, Sept. 29, 1989, as amended by 55 FR 17276, Apr. 24, 1990]

PART 152—[RESERVED]

PART 153—SHIPS CARRYING BULK LIQUID, LIQUEFIED GAS, OR COMPRESSED GAS HAZARDOUS MATERIALS

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APPENDIX I [RESERVED]

APPENDIX II [RESERVED]

APPENDIX III—METRIC UNITS USED IN PART 153

AUTHORITY: 46 U.S.C. 3703; 49 CFR 1.46. Section 153.40 issued under 49 U.S.C. 1804. Sections 153.470 through 153.491, 153.1100 through 153.1132, and 153.1600 through 153.1608 also issued under 33 U.S.C. 1903(b).

SOURCE: CGD 73-96, 42 FR 49027, Sept. 26, 1977, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes for Part 153 appear at CGD 82-072, 47 FR 28676, July 1, 1982, and at CGD 81-101, 52 FR 7777, Mar. 12, 1987.

Subpart A—General

§ 153.0 Availability of materials.

(a) Various sections in this part refer to the following documents which are incorporated in Annex II of MARPOL 73/78.

(1) IMO *Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances,* Resolution MEPC 18(22), 1985 in effect on April 6, 1987.

(2) IMO *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk,* Resolution MEPC 19(22), 1985 in effect on April 6, 1987.

(3) IMO *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk,* Resolution MEPC 20(22), 1985 in effect on April 6, 1987.

(b) The IMO documents listed in this section are available from the following:

(1) IMO Secretariat, Publications section, 4 Albert Embankment, London SE1 75R, United Kingdom, Telex 23588;

(2) New York Nautical Instrument and Service Company, 140 West Broadway, New York, NY 10013;

(3) Baker, Lyman & Company, 308 Magazine Street, New Orleans, LA 70130;

(4) Labelmaster, 5724 N. Pulaski Road; Chicago, IL 60646;

(5) UNZ & Company, 170 Broadway, New York, NY 10038; and

(6) Southwest Instrument Company, 235 West 7th Street, San Pedro, CA 90731.

[CGD 81-101, 52 FR 7777, Mar. 12, 1987]

§ 153.1 Applicability.

This part applies to the following:

(a) All United States self-propelled ships and those foreign self-propelled ships operating in United States waters that carry in bulk a cargo listed in Table 1 or allowed in a written permission under § 153.900(d), unless—

(1) The ship is carrying the cargo under 33 CFR Part 151;

(2) The ship is carrying the cargo in a portable tank under subpart 98.30 or 98.33 of this chapter; or

(3) The ship is an offshore supply vessel carrying the cargo under Subpart 98.31 of the chapter; or

(4) The ship is an incinerator vessel regulated under Part 150 of this subchapter.

(b) All United States oceangoing non-self-propelled ships and those foreign non-self-propelled ships operating in United States waters that carry in bulk a Category A, B, or C NLS cargo listed in Table 1 or allowed in a written permission under § 153.900(d), unless—

(1) The ship is carrying the cargo under 33 CFR Part 151;

(2) The ship is carrying the cargo in a portable tank under subpart 98.30 or 98.33 of this chapter;

(3) The ship is an offshore supply vessel carrying the cargo under Subpart 98.31 of this chapter; or

(4) The ship's Certificate of Inspection is endorsed for a limited short protected coastwise route and the ship is constructed and certificated primarily for service on an inland route.

(c) All ships that carry a bulk liquid, liquefied gas, or compressed gas cargo that is not—

(1) Listed in Table 1 of this part;

(2) Listed in Table 2 of this part;

(3) Carried under a written permission granted under § 153.900(d);

(4) Carried under Part 30 through 35, 98, 151, or 154 of this chapter; or

(5) Carried as an NLS under 33 CFR Part 151.

[CGD 81-101, 52 FR 7777, Mar. 12, 1987, as amended by CGD 84-025, 53 FR 15844, May 4, 1988; CGD 81-101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989; CGD 84-043, 55 FR 37413, Sept. 11, 1990]

§ 153.2 Definitions and acronyms.

As used in this part:

Accommodation spaces means halls, dining rooms, lounges, lavatories, cabins, staterooms, offices, hospitals, cinemas, game and hobby rooms, pantries containing no cooking appliances, and similar permanently enclosed spaces.

Adequate reception facility means each facility certified as adequate under 33 CFR 158.160 and each facility provided by a Administration signatory to MARPOL 73/78 under Regulation 7 of Annex II.

Annex II means Annex II to MARPOL 73/78 and is the Annex to MARPOL 73/78 regulating the discharge of noxious liquid substances to the sea.

B means the breadth of the vessel and is defined in § 42.13-15(d) of this chapter.

Built means that a ship's construction has reached any of the following stages:

(1) The keel is laid.

(2) The mass of the partially assembled ship is 50,000 kg.

(3) The mass of the partially assembled ship is one percent of the estimated mass of the completed ship.

Cargo area means that part of a vessel that includes the cargo tanks, spaces adjacent to the cargo tanks and the part of the deck over the cargo tanks and adjacent spaces.

Cargo containment system means a cargo tank, its cargo piping system, its venting system, and its gauging system.

Cargo handling space means an enclosed space that must be entered during a routine loading, carriage, or discharge of cargo and that contains an element of the cargo containment system having a seal or packing to prevent the escape of cargo, such as a valve, cargo pump, or cargo vapor compressor.

Cargo piping system means a tankship's permanently installed piping arrangement, including any valves and pumps, that carries cargo to or from a cargo tank.

Cargo tank means a tank that:

(1) Is part of or permanently affixed to a tankship; and

(2) Carries a cargo described in § 153.5 in any quantity, including residual liquid or vapor.

Certificate of Compliance means a certificate issued by the Coast Guard that a foreign flag vessel had been examined and found to comply with the regulations in this chapter.

Closed gauging system means an arrangement for gauging the amount of cargo in a tank, such as a float and tape or a magnetically coupled float and indicator, that does not have any opening through which cargo vapor or liquid can escape.

Combustible is defined in § 30.10-15 of this chapter.

Commandant means Commandant of the U.S. Coast Guard.

The term is often followed by a mailing code in parentheses. The mailing address should include any mailing code and should be written as follows:

Commandant (mailing code), U.S. Coast Guard, Washington, D.C. 20593-0001.

Control space is defined in § 30.10-19a of this chapter.

Cycle, means that the tank washing machine progresses through complete rotations until it reaches an orientation identical to its starting orientation.

NOTE: For a typical one or two nozzle tank washing machine that rotates in both the horizontal and vertical planes though more slowly in one than the other, a cycle would be at least one rotation in each plane of rotation.

Dedicated ballast tank means a tank that is used only for ballast.

Emergency shutdown station means a part of the tankship where the required emergency shutdown controls are clustered.

Flammable is defined in § 30.10-22 of this chapter.

Forward perpendicular is defined in § 42.13-15(b) of this chapter.

Hazardous material means a liquid material or substance that is—

(1) Flammable or combustible;

(2) Designated a hazardous substance under section 311(b) of the Federal Water Pollution Control Act (33 U.S.C. 1321); or

(3) Designated a hazardous material under section 104 of the Hazardous Material Transportation Act (HMTA) (49 U.S.C. 1803).

NOTE: The Environmental Protection Agency designates hazardous substances in 40 CFR Table 116.4A. The Coast Guard designates hazardous materials that are transported as bulk liquids by water in § 153.40.

High viscosity NLS includes high viscosity Category B NLS and high viscosity Category C NLS.

High viscosity Category B NLS means any Category B NLS having a viscosity of at least 25 mPa.s at 20 °C and at least 25 mPa.s at the time it is unloaded.

High viscosity Category C NLS means any Category C NLS having a viscosity of at least 60 mPa.s at 20 °C and at least 60 mPa.s at the time it is unloaded.

IMO means the International Maritime Organization (IMO, formerly Inter-Governmental Maritime Consultative Organization or IMCO).

IMO Bulk Chemical Code includes the IMO *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk*, Resolution MEPC 19(22), 1985 and the IMO *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk*, Resolution MEPC 20(22), 1985.

IMO Certificate includes a Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk issued under the IMO *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk*, Resolution MEPC 20(22), 1985 and an International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk issued under the IMO *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk*, Resolution MEPC 19(22), 1985.

Independent, as applied to a cargo piping, venting, heating or cooling system means that the system is connected to no other system, and has no means available for connection to another system.

Independent tank means a cargo tank that is permanently affixed to the vessel, that is self-supporting, that incorporates no part of the vessel's hull and that is not essential to the integrity of the hull.

Intank cargo pump means a pump:

(1) Located within the cargo tank it serves; and

(2) Whose piping passes through only the top of the cargo tank.

Integral tank means a cargo tank that also is part of or is formed in part by the vessel's hull structure so that the tank and the hull may be stressed by the same loads.

IOPP Certificate means an International Oil Pollution Prevention Certificate required under 33 CFR 151.19.

L means the length of the vessel and is defined in § 42.13-15(a) of this chapter.

Liquid means each substance having a vapor pressure of 172 kPa or less at 37.8 °C.

Marine Inspector is defined in § 30.10-43 of this chapter.

MARPOL 73/78 means the International Convention for Prevention of Pollution from Ships, 1973 (done at London, November 2, 1973), modified by the Protocol of 1978 relating to the International Convention for Prevention of Pollution from Ships, 1973 (done at London, on February 17, 1978).

Master means the person-in-charge of a self-propelled or non-self-propelled ship.

Mixture means a mixture containing only the substances described in conjunction with the term.

Nearest land has the same meaning as in 33 CFR 151.05(h).

Noxious liquid substance (NLS) means—

(1) Each substance listed in 33 CFR 151.47 or 33 CFR 151.49;

(2) Each substance having an "A," "B," "C," or "D" beside its name in the column headed "Pollution Category" in Table 1; and

(3) Each substance that is identified as an NLS in a written permission issued under § 153.900(c).

NLS Certificate means an International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk issued under Annex II of MARPOL 73/78.

Oceangoing ship has the same meaning as in 33 CFR 151.05(j).

Officer in Charge, Marine Inspection, is defined in § 1.05(b) of this chapter.

Open gauging means an arrangement for gauging the amount of cargo in a tank through a large opening, such as a tank hatch or ullage opening.

Open venting system means a venting system that always allows vapor to flow freely to and from the tank.

Phosphoric acid means phosphoric acid, superphosphoric acid, and aqueous solutions of phosphoric acid.

Pressure vacuum (PV) valve means a valve that is normally closed and which opens under a preset positive pressure or a vacuum.

Prewash means a tank washing operation that meets the procedure in § 153.1120.

Pumproom means any enclosed space containing a pump that is part of a cargo containment system.

Reception facility means anything capable of receiving NLS residues in a country whose Administration is not signatory to MARPOL 73/78 and each adequate reception facility.

Refrigerated tank means a cargo tank that is equipped to carry a cargo that must be cooled in order to keep the cargo's vapor pressure from exceeding the tank's pressure-vacuum or safety relief valve setting under ambient conditions of 32° C (approx. 90° F) still water and 46° C (approx. 115° F) still air.

Relief valve setting means the inlet line pressure at which a vent system's pressure-vacuum or safety relief valve fully opens.

Residues and mixtures containing NLSs (NLS residue) means—

(1) Any Category A, B, C, or D NLS cargo retained on the ship because it fails to meet consignee specifications;

(2) Any part of a Category A, B, C, or D NLS cargo remaining on the ship after NLS is discharged to the consignee, including but not limited to puddles on the tank bottom and in sumps, clingage in the tanks, and substance remaining in the pipes; or

(3) Any material contaminated with a Category A, B, C, or D NLS cargo, including but not limited to bilge slops, ballast, hose drip pan contents, and tank wash water.

Restricted gauging system means a method of gauging the amount of cargo in a tank through an opening of limited size that restricts or prevents the release of cargo vapors from the tank vapor space.

Safety relief (SR) valve means a normally closed valve that opens under a preset positive pressure.

Separate and *separated*, as applied to a cargo piping, venting, heating or cooling system, means either an independent system or one that may be disconnected from all other systems by:

(a) Removing spool pieces or valves and blanking the open pipe ends; or

(b) Blocking each system interconnection with two blind flanges in series and providing a means of detecting leakage into the pipe section between the flanges.

Service spaces means spaces outside the cargo area used for galleys, pantries containing cooking appliances, lockers, store rooms, workshops other than those forming part of machinery spaces, and trunks to such spaces.

Ship means a vessel of any type whatsoever, including hydrofoils, air-cushion vehicles, submersibles, floating craft whether self-propelled or not, and fixed or floating platforms.

Slop tanks include slop tanks and cargo tanks used as slop tanks.

Solidifying NLS means a Category A, B, or C NLS that has a melting point—

(1) Greater than 0 °C but less than 15 °C and a temperature, measured under the procedure in § 153.908(d), that is less than 5 °C above its melting point at the time it is unloaded; or

(2) 15 °C or greater and has a temperature, measured under the procedure in § 153.908(d), that is less than 10 °C above its melting point at the time it is unloaded.

Solution means a water solution.

Special area means the Baltic Sea Area as defined in 33 CFR 151.13(a)(2) and the Black Sea Area as defined in 33 CFR 151.13(a)(3).

SR venting system means a venting system in which an SR valve controls vapor flow from the cargo tank.

Tankship has the same meaning as "ship".

Venting system means a permanent piping arrangement leading from a cargo tank and used to control the flow of vapor to and from the tank.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21204, May 17, 1982; CGD 81-052, 50 FR 8732, Mar. 5, 1985; CGD 81-078, 50 FR 21170, May 22, 1985; CGD 81-101, 52 FR 7778, Mar. 12, 1987; CGD 81-101, 53 FR 28974, Aug. 1, 1988; CGD 88-070, 53 FR 34535, Sept. 7, 1988; CGD 81-101, 54 FR 12629, Mar. 28, 1989]

§ 153.3 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989]

§ 153.7 Ships built before December 27, 1977 and non-self-propelled ships built before July 1, 1983: Application.

(a) *Definitions.*

(1) "Permit" means a Certificate of Inspection, Letter of Compliance, or Certificate of Compliance.

(2) "Existing tankship" means a tankship for which a contract was let on or before December 27, 1977.

(3) "Letter of Compliance" in this section means a letter issued by the Coast Guard before 27 December 1977 which permitted a foreign flag tankship to carry a bulk cargo regulated under this part.

(b) *Endorsements for existing tankships.* (1) The Coast Guard endorses the permit of an existing tankship to carry a cargo listed in Table 1 if:

(i) The tankship held a permit on December 27, 1977, endorsed for the cargo in question;

(ii) The tankship meets the construction standards under which the Coast Guard issued the permit; and

(iii) The tankship meets the standards in paragraph (c) of this section.

(2) The Coast Guard endorses the permit of an existing tankship to carry a cargo listed in Table 1 if:

(i) The tankship held a permit on December 27, 1977;

(ii) The Coast Guard did not require the permit to be endorsed with the name of the cargo at any time before December 27, 1977;

(iii) The tankship meets the construction standards under which the Coast Guard issued the permit;

(iv) The tankship carried the cargo in question; and

(v) The tankship meets the standards in paragraph (c) of this section.

(3) The Coast Guard endorses the permit of an existing tankship to carry a cargo listed in Table 1 if:

(i) The tankship held a permit on December 27, 1977 endorsed to carry class B or C poisons under 46 CFR Part 39;

(ii) The cargo in question is a class B or C poison;

(iii) The tankship meets the construction standards in 46 CFR Part 39; and

(iv) The tankship meets the standards in paragraph (c) of this section.

(4) The Commandant (G-MTH) considers on a case by case basis endorsing the permit of an existing tankship to carry a cargo listed in Table 1 if:

(i) The tankship does not come within the categories described in paragraphs (b) (1) through (3) of this section;

(ii) The tankship meets paragraph (c) of this section; and

(iii) The tankship meets any additional requirements the Commandant (G-MTH) may prescribe.

(c) An existing tankship must meet all the requirements of this part except as provided in paragraphs (c) (3), (4), (5) and (6) of this section.

(1)-(2) [Reserved]

(3) The Commandant (G-MTH) considers on a case by case basis endorsing as a type II containment system one that fails to meet §§ 153.231(b), 153.234, 172.130 and 172.133 of this chapter if the tankship and containment system meet the following minimum conditions:

(i) The tankship has a loadline certificate.

(ii) The cargo tank is not part of the tankship's shell plating.

(iii) The distance between the bottom plating of the cargo tank and the bottom shell plating of the tankship is at least 76 cm measured parallel to the vertical axis of the tankship.

(4) The Commandant (G-MTH) considers on a case by case basis endorsing a containment system as a type II containment system if:

(i) The containment system is modified to meet § 153.231(b) by adding double bottoms or wing tanks; and

(ii) The tankship can survive the damage described in §§ 172.135 and 172.150 of this chapter to those parts of the tankship other than machinery spaces.

(5) The Commandant (G-MTH) considers on a case by case basis endorsing as a type III containment system one that does not meet §§ 153.234, 172.130 and 172.133 of this chapter if the tankship has a load line certificate.

(6) The Commandant (G-MTH) considers on a case by case basis endorsing the tankship to carry cargoes listed in Table 1 of this part if the tankship does not meet §§ 153.217, 153.219 and 153.254.

(d) Except as required by this paragraph, Subpart B of this part does not apply to a non-self-propelled ship that carries an NLS cargo under this part if—

(1) The ship was built before July 1, 1983;

(2) The ship carries no NLS cargo or NLS residue at any time it is in waters of another Administration signatory to MARPOL 73/78;

(3) The NLS does not require a type I containment system;

(4) The ship meets all requirements in Parts 30 through 34 and Part 151 of this chapter that apply to the cargo;

(5) The ship meets the provisions in § 153.216 and §§ 153.470 through 153.491 applying to the NLS category of that cargo;

(6) When the "Special Requirements" column of Table 1 contains an entry for § 153.408 or § 153.409 beside the cargo name, the ship meets the section, except the system prescribed by the section need be capable of operation only during loading;

(7) [Reserved]

(8) No part of the ship's hull plating is a component of a cargo tank if the cargo tank is endorsed to carry a cargo having a type II containment system in Table 1.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21204, May 17, 1982; CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 79-023, 48 FR 51009, Nov. 4, 1983; CGD 81-052, 50 FR 8733, Mar. 5, 1985; CGD 81-101, 52 FR 7779, Mar. 12, 1987; CGD 81-101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.8 Procedures for requesting an endorsed Certificate of Inspection.

(a) When applying for the endorsed Certificate of Inspection that § 153.900 requires for a ship to carry a cargo listed in Table 1, the applicant must proceed as follows:

(1) Send a letter to one of the Coast Guard offices listed in § 91.55-15 of this chapter that includes—

(i) A request for the endorsed Certificate of Inspection;

(ii) The name of the ship; and

(iii) A list of the cargoes from Table 1 the applicant wishes the endorsement to allow.

(2) Supply to the Coast Guard when requested—

(i) Hull type calculations;

(ii) The plans and information listed in §§ 54.01-18, 56.01-10, 91.55-5 (a), (b), (d), (g), and (h), and 110.25-1 of this chapter;

(iii) A copy of the Procedures and Arrangements Manual required by § 153.490; and

(iv) Any other ship information, including plans, design calculations, test results, certificates, and manufacturer's data, that the Coast Guard needs to determine if the ship meets this part.

(b) The Coast Guard notifies the applicant in writing—

(1) Whether any further information is necessary to evaluate the request for the endorsed Certificate of Inspection; and

(2) Of the outcome of the request for the endorsed Certificate of Inspection.

(c) The Coast Guard returns the Procedures and Arrangements Manual stamped "Approved" or indicating what corrections are necessary.

NOTE: The procedures for requesting an IOPP Certificate are found in 33 CFR Part 151.

[CGD 81-101, 52 FR 7779, Mar. 12, 1987]

§ 153.9 Foreign flag vessel endorsement application.

(a) *Application for a vessel whose flag administration issues IMO Certificates.* A person who desires a Certificate of Compliance [1] endorsed with the name of a cargo in Table 1 of this part, as described in § 153.900, must submit to Commanding Officer, U.S. Coast Guard Marine Safety Center (G-MSC), 400 Seventh St., SW., Washington, DC 20590-0001 an application which includes a copy of IMO Certificates [2] issued by the vessel's administration with:

(1) An additional classification society statement that the vessel complies with § 153.530 (b), (d), and (p)(1) if a person desires a Certificate of Compliance endorsed with the name of an alkylene oxide; and

(2) An additional classification society statement that the vessel complies with §§ 153.370, 153.371, and 153.438 if a person desires a Certificate of Compliance endorsed with the name of a cargo whose vapor pressure exceeds 100 kPa absolute at 37.8 °C (approximately 14.7 psia at 100 °F).

(b) *Application for a vessel whose flag administration does not issue IMO Certificates.* A person who desires a Certificate of Compliance [1] endorsed with the name of a cargo in Table 1 of this part, as described in § 153.900, must submit to Commanding Officer, U.S. Coast Guard Marine Safety Center (G-MSC), 400 Seventh St., SW., Washington, DC 20590-0001 an application that includes the following information:

(1) A copy of the vessel's Cargo Ship Safety Construction Certificate and Cargo Ship Safety Equipment Certificate issued under the International Convention for Safety of Life at Sea, 1974.

(2) A list of those cargoes for which the Letter of Compliance is to be endorsed.

(3) The specific tanks that are to be endorsed for each cargo.

(4) The names of the U.S. ports in which the person anticipates operating the vessel.

(5) The name of the vessel's flag administration.

(6) The name of the society that classes the vessel.

(7) A brief description of the vessel's cargo containment systems.

(8) Hull type calculations.

(9) The plans and information listed in §§ 54.01-18, 56.01-10, 91.55-5 (a), (b), (d), (g), and (h), and 111.05-5(d) of this chapter.

(c) *Conditions applying to all Certificate of Compliance applications.*

(1) If requested by the Commanding Officer, U.S. Coast Guard Marine Safety Center (G-MSC), 400 Seventh St., SW., Washington, DC 20590-0001, a person desiring a Certificate of Compliance for a vessel must furnish any other vessel information such as plans, design calculations, test results, certificates, and manufacturer's data, that the Coast Guard needs to determine that the vessel meets the standards of this part.

(2) Correspondence with the Coast Guard and vessel information submitted under this part must be in English except IMO Certificates which may be in French.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 81-052, 50 FR 8733, Mar. 5, 1985; 50 FR 15895, Apr. 23, 1985; CGD 88-070, 53 FR 34535, Sept. 7, 1988; CGD 88-070, 53 FR 37570, Sept. 27, 1988; CGD 89-025, 54 FR 19571, May 8, 1989; CGD 90-008, 55 FR 30663, July 26, 1990]

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[1] Until the Certificate of Compliance form is developed, the Letter of Compliance with a Subchapter O endorsement for the carriage of hazardous liquids will serve the purpose of the endorsed Certificate of Compliance.

[2] Generally, the IMO Certificate is sufficient for the Coast Guard to endorse the vessel's Certificate of Compliance with the names of those cargoes in Table 1 that are listed on the IMO Certificate. The IMO Certificate would not be sufficient when the Certificate authorized a cargo that is not permitted in U.S. waters, when the Certificate is in error or waives part of the Code, or when the regulations in this part exceed those of the Code.

§ 153.10 Procedures for requesting alternatives and waivers; termination of waivers.

(a) The Coast Guard considers allowing the use of an alternative in place of a requirement in this part if—

(1) The person wishing to use the alternative sends a written application to the Commandant (G-MTH) explaining—

(i) The requirement in this part that would not be met and the reason why;

(ii) The alternative the person proposes to be substituted; and

(iii) How the alternative would ensure a level of safety and pollution protection at least equal to that of the requirement for which the alternative would substitute;

(2) The alternative does not substitute an operational standard for a design or equipment standard; and

(3) The Commandant (G-MTH) determines that the alternative provides a level of protection for purposes of safety and pollution at least equal to the requirement in this part.

(b) The Coast Guard considers granting a waiver of a requirement for which this part allows a waiver if the person wishing the waiver sends a written application to the Commandant (G-MTH) that includes—

(1) A citation of the regulation that allows the waiver; and

(2) Any information and pledges that the regulation requires to be submitted with the application for the waiver.

(c) The Commandant notifies the applicant in writing—

(1) Whether any further information is necessary to evaluate the request for an alternative or waiver; and

(2) Of the outcome of the request for an alternative or waiver.

(d) A waiver issued under this part terminates if any—

(1) Information required to be supplied with the application for the waiver changes;

(2) Pledges required to be supplied with the application for the waiver are repudiated;

(3) Restrictions or procedures applying to operations under the waiver are violated; or

(4) Requirements in the section this part authorizing the waiver violated.

[CGD 81-101, 52 FR 7780, Mar. 12, 1987]

§ 153.12 IMO Certificates for Uni States Ships.

The Officer in Charge, Marine I spection issues a United States ship IMO Certificate endorsed to allow th carriage of a hazardous material NLS cargo in Table 1 if the followi requirements are met:

(a) The ship's owner must make a r quest to the OCMI for the IMO Ce tificate.

(b) The ship must meet this part.

(c) Self-propelled ships contract for after November 1, 1973 but bu before December 28, 1977 must me requirements in this part that apply a self-propelled ship built on Decem ber 28, 1977.

(d) Non-self-propelled ships co tracted for after November 1, 1973 b built before July 1, 1983 must me the requirements in this part applyi to non-self-propelled ships built July 1, 1983.

[CGD 81-101, 52 FR 7780, Mar. 12, 1987]

§ 153.15 Conditions under which the Co Guard issues a Certificate of Insp tion or Certificate of Compliance.

(a) The Coast Guard issues the e dorsed Certificate of Inspection r quired under § 153.900 for a Unite States ship to carry a hazardous mat rial or NLS listed in Table 1 if—

(1) The person wishing the Certi cate of Inspection applies followi the procedures under § 153.8; and

(2) The ship meets the design an equipment requirements of this pa and—

(i) Subchapter D of this chapter the hazardous material or NLS flammable or combustible; or

(ii) Either Subchapter D or I of thi chapter, at the option of the sh owner, if the hazardous material NLS is non-flammable or non-combus tible.

(b) The Coast Guard issues the en dorsed Certificate of Compliance re quired under § 153.900 for a foreig ship to carry a hazardous material or NLS listed in Table 1 if—

(1) The person wishing the Certificate of Compliance follows the procedures under § 153.9;

(2) The ship has an IMO Certificate issued by its Administration and endorsed with the name of the hazardous material or NLS if the ship's Administration is signatory to MARPOL 73/78;

(3) The ship meets the requirements of this part applying to United States ships and § 30.01-5(e) of this chapter if the ship's Administration is not signatory to MARPOL 73/78; and

(4) The ship meets any additional design and equipment requirements specified by the Commandant (G-MTH).

[CGD 81-101, 52 FR 7780, Mar. 12, 1987]

§ 153.16 Requirements for foreign flag vessel permits.

To have its Certificate of Compliance endorsed with the name of a cargo listed in Table 1, a foreign flag vessel must:

(a) Have an IMO Certificate, if the flag administration issues IMO Certificates, endorsed with the name of the cargo and meet any specific requirements in this subpart that the Commandant (G-MTH) may prescribe; or

(b) Meet the requirements of this subpart and § 30.01-5(e) of this chapter.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983; CGD 81-052, 50 FR 8733, Mar. 5, 1985; CGD 81-101, 52 FR 7780, Mar. 12, 1987]

§ 153.30 Special area endorsement.

The Coast Guard endorses the Certificate of Inspection of a United States ship allowing it to operate in special areas if the ship owner—

(a) Requests the endorsement following the procedures in § 153.8;

(b) Shows that the ship meets the design and equipment requirements applying to ships operating in special areas contained in Regulations 5, 5A, and 8 of Annex II and the Standards for Procedures and Arrangements.

[CGD 81-101, 52 FR 7780, Mar. 12, 1987]

§ 153.40 Determination of materials that are hazardous.

Under the authority delegated by the Secretary of Transportation in 49 CFR 1.46(t) to carry out the functions under 49 U.S.C. 1803, the Coast Guard has found the following materials to be hazardous when transported in bulk:

(a) Materials listed in Table 30.25-1 of this chapter.

(b) Materials listed in Table 151.05.

(c) Materials listed in Table 1.[1]

(d) Materials listed in Table 4 of Part 154.

(e) Materials that are NLSs under MARPOL Annex II.

(f) Liquids, liquefied gases, and compressed gases, that are—

(1) Listed in 49 CFR 172.101;

(2) Listed in 49 CFR 172.102; or

(3) Listed or within any of the definitions in Subparts C through O of 49 CFR Part 173.

(g) Those liquid, liquefied gas, and compressed gas materials designated as hazardous in the permissions granted under § 153.900(c).[2]

[CGD 81-101, 52 FR 7780, Mar. 12, 1987]

Subpart B—Design and Equipment

GENERAL VESSEL REQUIREMENTS

§ 153.190 Stability requirements.

Each vessel must meet the applicable requirements in Subchapter S of this chapter.

[CGD 79-023, 48 FR 51009, Nov. 4, 1983. Redesignated by CGD 81-101, 52 FR 7780, Mar. 12, 1987]

§ 153.201 Openings to accommodation, service or control spaces.

(a) Except as allowed in paragraph (b) of this section, entrances, ventilation intakes and exhausts, and other openings to accommodation, service, or control spaces must be located aft of the house bulkhead facing the cargo area a distance at least equal to the following:

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[1] Those hazardous material cargoes designated Category A, B, C, or D in Table 1 are also Noxious Liquid Substances under Annex II and the Act to Prevent Pollution from Ships, 33 U.S.C. 1901 *et seq.*

[2] The Coast Guard continues to propose in the FEDERAL REGISTER any addition of these designated hazardous materials to one of the tables referred to in paragraphs (a) through (d).

(1) 3 m (approx. 10 ft) if the vessel length is less than 75 meters (approx. 246 ft).

(2) L/25 if the vessel length is between 75 and 125 meters (approx. 246 ft and 410 ft).

(3) 5 m (approx. 16.5 ft) if the vessel length is more than 125 meters (approx. 410 ft).

(b) Fixed port lights, wheelhouse doors, and windows need not meet the location requirements specified in paragraph (a) of this section if they do not leak when tested with a fire hose at 207 kPa gauge (30 psig).

[CGD 81-078, 50 FR 21173, May 22, 1985]

§ 153.208 Ballast equipment.

(a) Except for the arrangement described in paragraph (b) of this section no piping that serves a dedicated ballast tank that is adjacent to a cargo tank may enter an engine room or accommodation space.

(b) Piping used only to fill a dedicated ballast tank adjacent to a cargo tank may enter an engine room or accommodation space if the piping has a valve or valving arrangement:

(1) Within the part of the tankship where a containment system may be located under § 153.234;

(2) That allows liquid to flow only towards that ballast tank (such as a check valve); and

(3) That enables a person to shut off the fill line from the weatherdeck (such as a stop valve).

(c) Except as prescribed in paragraph (d) of this section, pumps, piping, vent lines, overflow tubes and sounding tubes serving dedicated ballast tanks must not be located within a cargo containment system.

(d) Each vent line, overflow tube and sounding tube that serves a dedicated ballast tank and that is located within a cargo containment system must meet § 32.60-10(e)(2) of this chapter.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21207, May 17, 1982]

§ 153.209 Bilge pumping systems.

Bilge pumping systems for cargo pumprooms, slop tanks, and void spaces separated from cargo tanks by only a single bulkhead must be entirely within the locations allowed containment systems in § 153.234.

§ 153.214 Personnel emergency and safety equipment.

Each self-propelled ship must have the following:

(a) Two stretchers or wire baskets complete with equipment for lifting an injured person from a pumproom or a cargo tank.

(b) In addition to any similar equipment required by Subchapter D of this chapter, three each of the following:

(1) A 30 minute self-contained breathing apparatus of the pressure demand type, approved by the Mining Safety and Health Administration (formerly the Mining Enforcement and Safety Administration) and the National Institute for Occupational Safety and Health, or the tankship's flag administration with five refill tanks or cartridges of 30 minutes capacity each.

(2) A set of overalls or large aprons, boots, long sleeved gloves, and goggles, each made of materials resistant to the cargoes in Table 1 that are endorsed on the Certificate of Inspection or Certificate of Compliance.

(3) A steel-cored lifeline with harness.

(4) An explosion-proof lamp.

(c) First aid equipment.

[GCD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 77-222, 43 FR 57256, Dec. 7, 1978; CGD 78-128, 47 FR 21207, May 17, 1982; CGD 81-052, 50 FR 8733, Mar. 5, 1985; CGD 81-101, 52 FR 7781, Mar. 12, 1987]

§ 153.215 Safety equipment lockers.

Each self-propelled ship must have the following:

(a) Each tankship must have at least two safety equipment lockers.

(b) One safety equipment locker must be adjacent to the emergency shutdown station required by § 153.296(b). This locker must contain one set of the equipment required by § 153.214(a) and two sets of that required by § 153.214(b).

(c) The second safety equipment locker must be adjacent to the second emergency shutdown station required by § 153.296. This locker must contain the remaining equipment required by § 153.214 (a) and (b).

(d) Each safety equipment locker must be marked as described in § 153.955 (c), (d), and (e) with the legend "SAFETY EQUIPMENT."

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21207, May 17, 1982; CGD 81-101, 52 FR 7781, Mar. 12, 1987]

§ 153.216 Shower and eyewash fountains.

(a) Each non-self-propelled ship must have a fixed or portable shower and eyewash fountain that operates during cargo transfer and meets paragraph (c) of this section.

(b) Each self-propelled ship must have a shower and eyewash fountain that operates at all times and meets paragraph (c) of this section.

(c) The shower and eyewash fountains required by paragraphs (a) and (b) of this section must—

(1) Operate in any ambient temperature;

(2) Dispense water at a temperature between 0 °C and 40 °C (approx. 32 °F and 104 °F);

(3) Be located on the weatherdeck; and

(4) Be marked "EMERGENCY SHOWER" as described in § 153.955 (c), (d), and (e), so that the marking is visible from work areas in the part of the deck where the cargo containment systems are located.

[CGD 81-101, 52 FR 7781, Mar. 12, 1987]

§ 153.217 Access to enclosed spaces and dedicated ballast tanks.

An access opening to an enclosed space or a dedicated ballast tank must meet the requirements for a cargo tank access in § 153.254 (b), (c), and (d) if:

(a) The enclosed space or dedicated ballast tank is located within the cargo area of the vessel; or

(b) A part of a cargo containment system lies within the enclosed space or dedicated ballast tank.

[CGD 78-128, 47 FR 21207, May 17, 1982]

§ 153.219 Access to double bottom tanks serving as dedicated ballast tanks.

(a) Except as prescribed in paragraph (b) of this section, access openings to double bottom tanks serving as dedicated ballast tanks must not be located within a cargo containment system.

(b) Each access opening to a double bottom tank that is a dedicated ballast tank and that is located within a cargo containment system must be:

(1) Enclosed in an access trunk extending to the weatherdeck;

(2) Separated from the cargo containment system by two manhole coverings; or

(3) Approved by the Commandant (G-MTH).

[CGD 78-128, 47 FR 21207, May 17, 1982, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

CARGO CONTAINMENT SYSTEMS

§ 153.230 Type I system.

A type I containment system must meet the following requirements:

(a) The vessel must meet the requirements in Subpart F of Part 172 of this chapter for a type I hull.

(b) Except as described in § 153.235:

(1) It may be no closer to the tankship's shell than 76 cm (approx. 29.9 in.); and

(2) It may not be located in any part of the tankship subject to the damage described in Table 172.135 of this chapter for:

(i) COLLISION PENETRATION, Transverse extent; and

(ii) GROUNDING PENETRATION, Vertical extents from the baseline upward.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 79-023, 48 FR 51009, Nov. 4, 1983]

§ 153.231 Type II system.

A type II containment system must meet the following requirements:

(a) The vessel must meet the requirements in Subpart F of Part 172 of this chapter for a type I or II hull.

(b) Except as allowed in §§ 153.7 and 153.235—

(1) It may be no closer to the tankship's shell than 76 cm (approx. 29.9 in.); and

(2) It may not be located in any part of the tankship subject to the damage described in Table 172.135 of this chapter for GROUNDING PENETRATION, Vertical extent from the baseline upward.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 79-023, 48 FR 51009, Nov. 4, 1983; CGD 81-101, 52 FR 7781, Mar. 12, 1987]

§ 153.232 Type III system.

A type III containment system must be in either a type I, II, or III hull. The requirements for type I, II, and III hulls are in Subpart F of Part 172 of this chapter.

[CGD 79-023, 48 FR 51009, Nov. 4, 1983]

§ 153.233 Separation of tanks from machinery, service and other spaces.

(a) To prevent leakage through a single weld failure, the following spaces must be separated from a cargo by two walls, two bulkheads; or a bulkhead and a deck not meeting in a cruciform joint:

(1) Machinery spaces.

(2) Service spaces.

(3) Accommodation spaces.

(4) Spaces for storing potable domestic, or feed water.

(5) Spaces for storing edibles.

(b) Some examples of arrangements that may separate cargo from the spaces listed in paragraph (a) of this section are the following:

(1) Dedicated ballast tanks.

(2) Cargo pumprooms.

(3) Ballast pumprooms.

(4) Tanks not carrying a cargo listed in this part.[3]

(5) A cofferdam aft of the cargo containment systems and whose forward bulkhead is forward of any joint common to an accommodations space and the deck.

(6) Double walled piping or a piping tunnel.

§ 153.234 Fore and aft location.

Except as allowed in § 153.7, each ship must meet the following:

(a) Each cargo containment system and any compartments within which a containment system is located must be forward of a tankship's accommodation spaces.

(b) Except as described in § 153.235, each cargo containment system must be located at least 0.05L aft of the forward perpendicular, but in no case forward of a collision bulkhead.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 81-101, 52 FR 7781, Mar. 12, 1987]

§ 153.235 Exceptions to cargo piping location restrictions.

Cargo piping must not be located in those areas from which a containment system is excluded by §§ 153.230(b), 153.231(b), and 153.234(b) unless the cargo piping:

(a) Drains back to the cargo tank under any heel or trim resulting from the damage specified in § 172.135 of this chapter; and

(b) Enters the cargo tank above the liquid level for a full tank in any condition of heel or trim resulting from the damage specified in § 172.135 of this chapter.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 79-023, 48 FR 51009, Nov. 4, 1983]

§ 153.236 Prohibited materials.

When one of the following paragraphs of this section is referenced in Table 1, the materials listed in that paragraph may not be used in components that contact the cargo liquid or vapor:

(a) Aluminum or aluminum alloys.

(b) Copper or copper alloys.

(c) Zinc, galvanized steel or alloys having more than 10 percent zinc by weight.

(d) Magnesium.

(e) Lead.

(f) Silver or silver alloys.

(g) Mercury.

§ 153.238 Required materials.

When one of the following paragraphs of this section is referenced in Table 1, only those materials listed in that paragraph may be used in components that contact the cargo liquid or vapor:

---

[3] See also §§ 32.56-5 and 32.60-10 of this chapter for limitations on the stowage of combustible liquids adjacent to ignition sources.

(a) Aluminum, stainless steel, or steel covered with a protective lining or coating.

(b) With cargo concentrations of 98 percent or greater, aluminum or stainless steel.

(c) With cargo concentrations of less than 98 percent, 304L or 316 stainless steel.

(d) Solid austenitic stainless steel.

(e) Stainless steel or steel covered with a suitable protective lining or coating. (See § 153.266.)

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 88-100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 153.239 Use of cast iron.

(a) Cast iron used in a cargo containment system must meet the requirements of § 56.60-10(b) of this chapter.

(b) For purposes of this section, the term "lethal products" in § 56.60-10(b) means those cargoes that Table 1 references to § 153.525 or § 153.527.

[CGD 78-128, 47 FR 21207, May 17, 1982]

§ 153.240 Insulation.

Cargo containment system insulation made necessary by the requirements of this part must meet the requirements in § 38.05-20 of this chapter. However, the vapor barrier required by § 38.05-20(b) is unnecessary if the insulation is:

(a) Protected from the weather, and attached to a containment system maintained at a temperature in excess of 46° C (approx. 115° F); or

(b) In an atmosphere whose dewpoint is less than the temperature of any surface in contact with the insulation.

CARGO TANKS

§ 153.250 Double-bottom and deep tanks as cargo tanks.

Except in those cases in which Commandant (G-MTH) specifically approves another arrangement, such as a double-bottom or deep tank as a cargo tank, an integral cargo tank or the hold within which an independent cargo tank is located must extend to the weatherdeck.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 153.251 Independent cargo tanks.

All independent cargo tank must meet § 38.05-10 (a)(1), (b), (d), and (e)(1) of this chapter.

[CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.252 Special requirement for an independent cargo tank.

When Table 1 refers to this section, the cargo tank must be an independent tank that meets §§ 38.05-2(d) and 38.05-4(g) of this chapter. (See also § 153.256(b)).

[CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.254 Cargo tank access.

(a) A cargo tank must have at least one covered manhole opening into the vapor space described in § 153.354.

(b) An access through a vertical cargo tank surface must be at least 60 cm by 80 cm (approx. 23.6 x 31.5 in.) and no more than 60 cm above a foothold grating, or surface on both sides of the access way.

(c) An access through a horizontal cargo tank surface must be at least 60 cm by 60 cm (approx. 23.6 x 23.6 in.).

(d) An access trunk must be no less than 76 cm (approx. 29.9 in.) in diameter.

§ 153.256 Trunks, domes, and openings of cargo tanks.

(a) The hatch of a cargo tank must:

(1) Be at the highest point of the tank; and

(2) Open on or above the weatherdeck.

(b) To be endorsed to carry a cargo requiring an independent cargo tank, a tank must have:

(1) A trunk or dome at the uppermost part of the tank, extending above the weatherdeck;

(2) Its hatch at the top of the trunk or dome; and

(3) No openings below the weatherdeck.

§ 153.266 Tank linings.

A tank lining must be:

(a) At least as elastic as the tank material; and

(b) Applied or attached to the tank as recommended by the lining manufacturer.

PIPING SYSTEMS AND CARGO HANDLING EQUIPMENT

§ 153.280 Piping system design.

(a) Each cargo piping system must meet the standards of Part 56 and §§ 38.10-1(b), 38.10-1(e), and 38.10-10(a) of this chapter.

(b) Piping carrying cargo or cargo residue may not enter any machinery space except a cargo pumproom.

§ 153.281 Piping to independent tanks.

Piping for an independent cargo tank must penetrate the tank only through that part of the tank or dome extending above the weatherdeck.

[CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.282 Cargo filling lines.

The discharge point of a cargo tank filling line must be no higher above the bottom of the cargo tank or sump than 10 cm (approx. 4 in.) or the radius of the filling line, whichever is greater.

§ 153.283 Valving for cargo piping.

(a) Except as described in this section, a cargo line must have a deck operable, manual stop valve:

(1) In each tank which the line serves; and

(2) At each cargo hose connection point.

(b) The valve required by paragraph (a)(1) of this section may be in a cargo pumproom at the pumproom bulkhead if the cargo tank the cargo line serves is adjacent to the pumproom.

(c) The valve required by paragraph (a)(1) of this section may be on the weatherdeck if:

(1) The weatherdeck is the top of the tank;

(2) The line goes through the weatherdeck into the tank; and

(3) The valve is at the point where the line penetrates the weatherdeck.

(d) The valve required by paragraph (a)(1) of this section may be outside the tank if:

(1) The tank is an independent tank; and

(2) The valve is at the point where the line penetrates the tank.

(e) The discharge line of an intank cargo pump need not have the valve required by paragraph (a)(1) of this section.

(f) If the cargo exerts a gravity head pressure on a valve required by this section, the valve must be a positive shutoff valve that meets § 56.50-60(d) of this chapter.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.284 Characteristics of required quick closing valves.

A remotely actuated quick closing shutoff valve required by § 153.530(n) must:

(a) Be a positive shutoff valve;

(b) Be of the fail-closed type that closes on loss of power;

(c) Be capable of local manual closing;

(d) Close from the time of actuation in 30 seconds or less; and

(e) Be equipped with a fusible element that melts at less than 104° C. (approx. 220° F.) and closes the valve.

[CGD 78-128, 47 FR 21208, May 17, 1982; 47 FR 27293, June 24, 1982]

§ 153.285 Valving for cargo pump manifolds.

(a) When cargo lines serving different tanks enter a pumproom and connect to the same pump:

(1) Each cargo line must have a stop valve within the line;

(2) The valve must be before the cargo line joins the other lines or pump; and

(3) The valve must be within the pumproom.

(b) The valve in paragraph (a) of this section is required in addition to any valve required under § 153.283(b).

§ 153.292 Separation of piping systems.

Cargo piping systems must be arranged so that operations necessary to provide separate systems can be accomplished in a cargo handling space or on the weatherdeck.

[CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.294 Marking of piping systems.

(a) Each cargo piping system must be marked with the designation number of the cargo tank it serves at each hose connection, valve, and blind in the piping system. The markings must be in characters at least 5 cm (approx. 2 in.) high.

(b) Every hose connection of a cargo piping system must be marked with the cargo piping system's working pressure required by § 38.10-10(a) of this chapter.[4]

§ 153.296 Emergency shutdown stations.

(a) Each tankship must have at least two emergency shutdown stations.

(b) One emergency shutdown station must be located forward of the deckhouse, in the after part of the weatherdeck in which the cargo tanks are located.

(c) A second emergency shutdown station must be located so that one of the two stations is accessible from any part of the weatherdeck if a break in a cargo piping system or hose causes spraying or leaking.

(d) Each emergency shutdown station must contain a single remote actuator for all quick closing shutoff valves required by this part.

(e) Each emergency shutdown station must have the controls necessary to stop all cargo pumps on the tankship.

(f) Any remote emergency actuator, such as that for a quick closing shutoff valve, a cargo pump, or a water spray system, must be of a type that will not defeat the operation of other remote emergency actuators. The emergency action must occur whether one or several actuators are operated.

(g) Each emergency shutdown station must be marked as described in § 153.955 (c), (d), and (e) with the legend "EMERGENCY SHUTDOWN STATION" so that the legend is visible from work areas in the part of the deck where the cargo containment systems are located.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.297 Emergency actuators at the point of cargo control.

(a) The point from which cargo transfer is controlled must have the same actuators an emergency shutdown station must have under § 153.296 and an actuator for any deck water spray systems required by this part.

(b) The point from which cargo transfer is controlled may be one of the emergency shutdown stations required under § 153.296 if it meets the requirements of that section.

CARGO HANDLING SPACE VENTILATION

§ 153.310 Ventilation system type.

A cargo handling space must have a permanent forced ventilation system of the exhaust type.

§ 153.312 Ventilation system standards.

A cargo handling space ventilation system must meet the following:

(a) A ventilation system exhaust duct must discharge no less than 10 m (approx. 32.8 ft) from openings into or ventilation intakes for, accommodation or service spaces.

(b) A ventilation system must not recycle vapors from ventilation discharges.

(c) Except for the space served by the ventilation duct, a ventilation duct must not pass through a machinery room, an accommodation space, or working spaces.

(d) A ventilation system must be operable from outside the space it ventilates.

(e) A ventilation system must be sized to change the air in the ventilated space at least 30 times per hour.

(f) A ventilation system must not allow air to stagnate in any part of a ventilated space.

(g) A ventilation system must be able to exhaust air from both above and below the deck plates of a ventilated space.

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[4] See § 153.280 of the part.

§ 153.314 Ventilation of spaces not usually occupied.

(a) Each tankship must have portable ventilation equipment that fits the mount required in paragraph (b)(1) of this section.

(b) Each enclosed space within the cargo area that does not have a permanent ventilation system meeting § 153.312 must have:

(1) A mount for the portable mechanical ventilation equipment required by this section; and

(2) Either permanent ventilation ductwork connected to the mount and arranged to supply air to the extremities of the space; or

(3) An attachment for temporary ductwork at the mount with enough ductway in the ventilated space and temporary ductwork stowed aboard the vessel to supply air to the extremities of the space.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.316 Special cargo pumproom ventilation rate.

When Table 1 refers to this section, the cargo pumproom ventilation system must change the air in the cargo pumproom 45 times per hour and discharge no less than 4 m (approx. 13.1 ft) above the deck.

Cargo Pumprooms

§ 153.330 Access.

(a) The access door to a cargo pumproom must open on the weatheredeck.

(b) The access way to a cargo pumproom and its valving must allow passage of a man wearing the breathing apparatus required by § 153.214(b)(1).

(c) Each ladderway in a cargo pumproom must be free from obstructions by piping, framework, or other equipment.

(d) Cargo pumproom ladders and platforms must have guard railings.

(e) Each ladder to a cargo pumproom must have an incline from the horizontal of less than 60°.

§ 153.332 Hoisting arrangement.

(a) A cargo pumproom located below the weatherdeck must have a permanent hoisting arrangement with a lifting capacity of 2500 N (approx. 562 lbs), operable from the weatherdeck for the removal of an unconscious person.

(b) The cargo pumproom must have a 60 cm by 60 cm (approx. 2 ft by 2 ft) cross-sectional clearance through the hoistway.

§ 153.333 Cargo pump discharge pressure gauge.

Each cargo pump within a pumproom must have a discharge pressure gauge outside the pumproom.

§ 153.334 Bilge pumping systems.

(a) A cargo pumproom must have a bilge pumping system.

(b) The bilge pumping system must have:

(1) Complete remote operating controls outside the cargo pumproom; and

(2) An alarm that operates when the depth of liquid in the bilges exceeds 50 cm (approx. 19.7 in.).

§ 153.336 Special cargo pump or pumproom requirements.

(a) When Table 1 refers to this section:

(1) The cargo pump must be an intank cargo pump;

(2) The cargo pumproom must be on or above the weatherdeck; or

(3) The cargo pumproom must have the specific approval of the Commandant (G-MTH).

(b) For a cargo pumproom described in paragraph (a)(2) or (a)(3) the tankship must:

(1) Have a low pressure breathing quality air supply system for use with the breathing apparatus in the pumproom; or

(2) Meet any requirements specified by the Commandant (G-MTH).

(c) A low pressure air supply system described in paragraph (b)(1) of this section must:

(1) Run from fixed air bottles to the pumproom;

(2) Have an air compressor to recharge the fixed air bottles;

(3) have hose connections in the pumproom suitable for use with the breathing apparatus required in § 153.214(b)(1); and

(4) have the air capacity to enable two men to work in the pumproom for at least one hour each without using the cartridges for the breathing apparatus required in § 153.214(b)(1).

[CGD 78-128, 47 FR 21208, May 17, 1982, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

CARGO VENTING SYSTEMS

§ 153.350 Location of B/3 vent discharges.

Except as prescribed in § 153.353, a B/3 venting system must discharge:

(a) At the highest of the following points:

(1) 6m (approx. 19.7 ft) above the weatherdeck.

(2) B/3 above the weatherdeck.

(3) 6m (approx. 19.7 ft) above a walkway, if the walkway is within a 6m (approx. 19.7 ft) horizontal radius from the vent discharge.

(b) At least 15m (approx. 49.2 ft) from air intakes for, or openings into, accommodation and service spaces.

[CGD 78-128, 47 FR 21208, May 17, 1982; 47 FR 27293, June 24, 1982]

§ 153.351 Location of 4m vent discharges.

Except as prescribed in § 153.353, a 4m venting system must discharge:

(a) At least 4m (approx. 13.1 ft) above the higher of:

(1) the weatherdeck; or

(2) any walkway that is within a 4m (approx. 13.1 ft) horizontal radius from the vent discharge.

(b) At least 10m (approx. 32.8 ft) from air intakes for, or openings into, accommodation or service spaces.

[CGD 78-128, 47 FR 21208, May 17, 1982]

§ 153.352 B/3 and 4 m venting system outlets.

A B/3 or 4 m venting system outlet must:

(a) Discharge vertically upwards; and

(b) Prevent precipitation from entering the vent system.

§ 153.353 High velocity vents.

The discharge point of a B/3 or 4m venting system must be located at least 3m (approx. 10 ft) above the weatherdeck or walkway if:

(a) The discharge is a vertical, unimpeded jet;

(b) The jet has a minimum exit velocity of 30 m/sec (approx. 98.4 ft/sec); and

(c) The high velocity vent has been approved by Commandant (G-MTH).

[CGD 78-128, 47 FR 21208, May 17, 1982, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.354 Venting system inlet.

A venting system must terminate in the vapor space above the cargo when the tank is filled to a 2 percent ullage and the tankship has no heel or trim.

§ 153.355 PV venting systems.

When Table 1 requires a PV venting system, the cargo tank must have a PV valve in its vent line. The PV valve must be located between the tank and any connection to another tank's vent line (such as a vent riser common to two or more tanks).

§ 153.358 Venting system flow capacity.

(a) The cross-sectional flow area of any vent system segment, including any PV or SR valve, must at no point be less than that of a pipe whose inside diameter is 6.4 cm (approx. 2.5 in.).

(b) When Table 1 requires a closed or restricted gauging system, calculations must show that, under conditions in which a saturated cargo vapor is discharged through the venting system at the maximum anticipated loading rate, the pressure differential between the cargo tank vapor space and the atmosphere does not exceed 28 kPa gauge (approx. 4 psig), or, for independent tanks, the maximum working pressure of the tank.

§ 153.360 Venting system restriction.

A venting system must have no assembly that could reduce its cross-sectional flow area or flow capacity to less than that required in § 153.358.

§ 153.361 Arrangements for removal of valves from venting systems having multiple relief valves.

A venting system having multiple relief valves may be arranged to allow the removal of a valve (for repair, as an example) provided the venting system:

(a) Has valves that are interlocked, so that the removal of a valve does not reduce the venting system relieving capacity below the minimum relieving capacity required by § 153.358; and

(b) Is arranged so that cargo vapor will not escape through the opening left after a valve has been removed.

[CGD 78-128, 47 FR 21208, May 17, 1982; 47 FR 27293, June 24, 1982]

§ 153.362 Venting system drain.

Unless a cargo vent system at every point is level or slopes back to the cargo tank under all conditions of heel and trim allowed under § 153.806, the cargo vent system must have a drain valve at each low point (trap) in the vent line.

§ 153.364 Venting system supports.

Supports for a vent system must meet § 38.10-10(c) of this chapter.

§ 153.365 Liquid overpressurization protection.

(a) Except as noted in paragraph (b) of this section, a containment system requiring closed or restricted gauging must:

(1) Be designed to withstand the maximum pressure that develops during an overfill of the densest cargo endorsed for the containment system; or

(2) Have an overflow control system that meets § 153.408; or

(3) Meet the requirements specified by the Commandant (G-MTH).

(b) A containment system requiring restricted gauging, except for those cargoes that reference §§ 153.525 or 153.527, may be equipped with a spill valve that:

(1) Is specifically approved by the Commandant (G-MTH); and

(2) Limits the maximum pressure during liquid overfill at a specified cargo loading rate to that which the containment system is able to withstand (see §§ 153.294(b) and 152.977(b)).

[CGD 78-128, 47 FR 21208, May 17, 1982, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.368 Pressure-vacuum valves.

(a) The pressure side of a required pressure-vacuum relief valve must begin to open only at a pressure exceeding 3.5 kPa gauge (approx. 0.5 psig).

(b) A pressure-vacuum relief valve must meet the requirements of Subpart 162.017 of this chapter.

§ 153.370 Minimum relief valve setting for ambient temperature cargo tanks.

The relief valve setting for a containment system that carries a cargo at ambient temperature must at least equal the cargo's vapor pressure at 46 °C (approx. 115 °F).

[CGD 81-078, 50 FR 21173, May 22, 1985]

§ 153.371 Minimum relief valve setting for refrigerated cargo tanks.

The relief valve setting for a containment system that carries a refrigerated cargo must at least equal the lesser of:

(a) That in § 153.370; or

(b) 110 percent of the cargo's vapor pressure at the steady state temperature obtained by a full tank of cargo with the refrigeration system operating under ambient conditions described within the definition of a refrigerated tank in § 153.2.

§ 153.372 Gauges and vapor return for cargo vapor pressures exceeding 100 kPa (approx. 14.7 psia).

When table 1 references this section, the containment system must have a:

(a) Tank pressure gauge at the point where cargo flow is controlled during transfer; and

(b) Vapor return connection.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977; 42 FR 57126, Nov. 1, 1977, as amended by CGD 81-078, 50 FR 21173, May 22, 1985]

Cargo Gauging Systems

§ 153.400 General requirements for gauges.

(a) Columnar gauge glasses must not be installed on a cargo containment system.

(b) Flat sight glasses must meet § 38.10-20(h) of this chapter.

§ 153.404 Standards for containment systems having required closed gauges.

When Table 1 requires a cargo's containment system to have a closed gauge, the containment system must have the following:

(a) A permanently installed closed gauging system.

(b) A vapor return connection.

(c) The high level alarm described in § 153.409.

(d) Either a closed cargo sampling system or a cargo sampling arrangement allowing the retrieval of a sample through an orifice not exceeding:

(1) 0.635 cm (approx. 0.25 in.) diameter when the cargo's vapor pressure is 28 kPa gauge (approx. 4 psig) or less; or

(2) 0.140 cm (approx. 0.055 in.) diameter when the cargo's vapor pressure exceeds 28 kPa (approx. 4 psig).

§ 153.406 Standards for containment systems having required restricted gauges.

When Table 1 requires a cargo's containment system to have a restricted gauge, the containment system must have:

(a) A closed gauging system; or

(b) A system that has:

(1) A restricted gauge (e.g., a sounding tube) with an orifice diameter not exceeding 20 cm (approx. 7.8 in.);

(2) A permanently attached gauge cover that is vapor tight when in place; and

(3) A venting system that has either:

(i) Lock open PV valves; or

(ii) Valved bypasses around the PV valves.

§ 153.407 Special requirements for sounding tube gauges.

(a) A sounding tube installed as a restricted gauge must extend to within one meter (approx. 39.4 in.) of the bottom of the tank.

(b) A sounding tube must not be installed on a tank whose relief valve setting exceeds 28 kPa (approx. 4 psig) unless it is specifically permitted by the Commandant (G-MTH).

(c) A sounding tube must have no perforations in the tube wall.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.408 Tank overflow control.

(a) When table 1 references this section, a cargo containment system must have a cargo high level alarm meeting § 153.409 and one of the following additional systems:

(1) A second high level (cargo overflow) alarm.

(2) A system that automatically stops cargo flow to the tank (automatic shutdown system).

(b) The high level alarm and the cargo overflow alarm or automatic shutdown system must:

(1) Be independent of one-another; and

(2) Operate on loss of power.

(c) The cargo overflow alarm or the automatic shutdown system must operate early enough to:

(1) Stop the loading operation before the cargo tank overflows; and

(2) Avoid surge pressures that exceed the working pressure specified in § 153.294(b).

(d) A tank overflow must be identified with the legend "TANK OVERFLOW ALARM" in lettering as specified for the warning sign in § 153.955.

(e) A tank overflow alarm must be audible and visible in that part of the deck where the containment systems are located and at the point where cargo loading is controlled on the tankship.

(f) The automatic shutdown system or tank overflow alarm must be able to be checked at the tank for proper operation (for example, by electrically simulating an overfill at the tank gauge connection).

(g) In this section, "independent" as applied to two systems means that one system will operate with a failure of any part of the other system except high level power sources and electrical feeder panels. Conduit need not be independent; the control wiring for several independent systems may be carried in a single conduit.

[CGD 81-078, 50 FR 21173, May 22, 1985]

§ 153.409 High level alarms.

When Table 1 refers to this section or requires a cargo to have a closed gauging system, the cargo's containment system must have a high level alarm:

(a) That gives an audible and visual alarm before the tank fills to 97 percent of its capacity;

(b) That can be seen and heard where cargo transfer is controlled and on the open deck;

(c) Whose operation can be checked prior to each loading; and

(d) That must be marked as described in § 153.408(c)(6) with the legend "HIGH LEVEL ALARM."

[CGD 78-128, 47 FR 21209, May 17, 1982; 47 FR 27293, June 24, 1982]

CARGO TEMPERATURE CONTROL SYSTEMS

§ 153.430 Heat transfer systems; general.

Each cargo cooling system required by this part and each cargo heating system must:

(a) Meet the standards of Subchapters F (Marine Engineering) and J (Electrical Engineering) of this chapter;

(b) Have valving that enables the system to be separated from all other cooling and heating systems; and

(c) Allow manual regulation of the system's heat transfer rate.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21209, May 17, 1982; CGD 81-078, 50 FR 21174, May 22, 1985]

§ 153.432 Cooling systems.

(a) Each cargo cooling system must have an equivalent standby unit that is installed and that can be placed in operation immediately after failure of the primary cooling system.

(b) Each tankship that has a cargo tank with a required cooling system must have a manual that contains:

(1) A piping diagram for the cooling system; and

(2) Instructions for changing over to the standby system described in paragraph (a) of this section.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21209, May 17, 1982]

§ 153.434 Heat transfer coils within a tank.

When a cargo tank contains any quantity of cargo, a cargo cooling or heating system having coils within the tank must keep the heat transfer fluid at a pressure greater than the pressure exerted on the heating or cooling system by the cargo.

[CGD 78-128, 47 FR 21209, May 17, 1982]

§ 153.436 Heat transfer fluids: compatibility with cargo.

A heat transfer fluid separated from the cargo by only one wall (for example, the heat transfer fluid in a coil within a tank) must be compatible with the cargo under the standards prescribed for compatibility between two cargoes in Part 150 of this chapter.

[CGD 81-078, 50 FR 21174, May 22, 1985]

§ 153.438 Cargo pressure or temperature alarms required.

(a) Each refrigerated tank must have:

(1) An alarm that operates when the cargo's pressure exceeds the vapor pressure described in § 153.371(b); or

(2) An alarm that operates when the cargo's temperature exceeds the steady state temperature described in § 153.371(b).

(b) The alarm must give an audible and visual signal on the bridge and at the cargo control station.

(c) The cargo pressure or temperature alarm must be independent of other cargo pressure or temperature sensing arrangements.

§ 153.440 Cargo temperature sensors.

(a) Except as prescribed in paragraph (c) of this section, when Table 1 refers to this section, the containment system must meet the following requirements:

(1) A heated or refrigerated cargo tank must have a remote reading thermometer sensing the temperature of the cargo at the bottom of the tank.

(2) A refrigerated tank must have a remote reading second thermometer near the top of the tank and below the maximum liquid level allowed by § 153.981.

(3) Unless waived under § 153.491(a), a cargo tank endorsed to carry a Category A, B, or C NLS cargo must have a thermometer whose temperature reading is no greater than the temperature of the cargo at a level above the tank bottom at least one-eighth but no

more than one-half the height of the tank if the cargo is—

(i) A Category A NLS or a Category B NLS having a viscosity of at least 25 mPa.s at 20 °C;

(ii) A Category C NLS having a viscosity of at least 60 mPa.s at 20 °C; or

(iii) A Category A, B, or C NLS that has a melting point greater than 0 °C.

(b) A readout for each remote thermometer required by this section must be at the point where cargo transfer is controlled.

(c) A portable thermometer may be substituted for the equipment required in paragraphs (a) and (b) of this section if—

(1) Table 1 allows open gauging with the cargo; or

(2) Table 1 allows restricted gauging with the cargo, and the portable thermometer is designed to be used through the containment system's restricted gauging system.

[CGD 78-128, 47 FR 21209, May 17, 1982, as amended by CGD 81-101, 52 FR 7781, Mar. 12, 1987; CGD 81-101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

SPECIAL REQUIREMENTS FOR FLAMMABLE OR COMBUSTIBLE CARGOES

§ 153.460 Fire protection systems.

Each self-propelled ship and each manned non-self-propelled ship must meet the following:

(a) With the exception of the vent riser, each part of a cargo containment system exposed on the weatherdeck must be covered by the fire protection system listed beside the cargo in Table 1 and described in the footnotes to Table 1.

(b) The Commandant (G-MTH) approves the substitution of a dry chemical (D) type fire protection system for an A or B type on a case by case basis.

(c) A fire protection system required by this part must meet Part 34 of this chapter or be specifically approved by the Commandant (G-MTH).

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 81-101, 52 FR 7781, Mar. 12, 1987]

§ 153.461 Electrical bonding of independent tanks.

An independent metallic cargo tank that carries a flammable or combustible cargo must be electrically bonded to the tankship's hull.

§ 153.462 Static discharges from inert gas systems.

An inert gas system on a tank that carries a flammable or combustible cargo must not create static arcing as the inert gas is injected into the tank.

§ 153.463 Vent system discharges.

The discharge of a venting system must be at least 10 m (approx. 32.8 ft) from an ignition source if:

(a) The cargo tank is endorsed to carry a flammable or combustible cargo; and

(b) Table 1 requires the cargo to have a PV venting system.

§ 153.465 Flammable vapor detector.

(a) A tankship that carries a flammable cargo must have two vapor detectors that meet § 35.30-15(b) of this chapter.

(b) At least one of the vapor detectors in paragraph (a) of this section must be portable.

§ 153.466 Electrical equipment.

A tankship carrying a flammable or combustible cargo under this part must meet Subchapter J of this chapter.

DESIGN AND EQUIPMENT FOR POLLUTION CONTROL

SOURCE: Sections 153.470 through 153.491 appear at CGD 81-101, 52 FR 7781, Mar. 12, 1987, unless otherwise noted.

§ 153.470 System for discharge of NLS residue to the sea: Categories A, B, C, and D.

Unless waived under § 153.491, each ship that discharges Category A, B, or C NLS residue, or Category D NLS residue not diluted to ¹⁄₁₀th of its original concentration, into the sea under §§ 153.1126 and 153.1128 must have an NLS residue discharge system meeting the following:

(a) *Minimum diameter of an NLS residue discharge outlet.* The outlet of each NLS residue discharge system must have a diameter at least as great as that given by the following formula:

$$D = \frac{(Q_d)(\text{cosine } \phi)}{5L}$$

Where:

D=Minimum diameter of the discharge outlet in meters.

Q_d=Maximum rate in cubic meters per hour at which the ship operator wishes to discharge slops (note: Q_d affects the discharge rate allowed under § 153.1126(b)(2)).

L=Distance from the forward perpendicular to the discharge outlet in meters.

ϕ=The acute angle between a perpendicular to the shell plating at the discharge location and the direction of the average velocity of the discharged liquid.

(b) *Location of an NLS residue discharge outlet.* Each NLS residue discharge outlet must be located—

(1) At the turn of the bilge beneath the cargo area; and

(2) Where the discharge from the outlet is not drawn into the ship's seawater intakes.

(c) *Location of dual NLS residue discharge outlets.* If the value of 6.45 for K is used in § 153.1126(b)(2), the NLS residue discharge system must have two outlets located on opposite sides of the ship.

NOTE: A ship built before July 1, 1986 does not need a residue discharge system to discharge to the sea under § 153.1128 until January 1, 1988.

[CGD 81-101, 52 FR 7781, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.480 Stripping quantity for Category B and C NLS tanks on ships built after June 30, 1986: Categories B and C.

Unless waived under § 153.491, Category B and C NLS cargo tanks on each ship built after June 30, 1986 must have stripping quantities determined under § 153.1604 that are less than—

(a) 0.15 m^3 if Category B; and

(b) 0.35 m^3 if Category C.

§ 153.481 Stripping quantities and interim standards for Category B NLS tanks on ships built before July 1, 1986: Category B.

Unless waived under § 153.483 or § 153.491, each Category B NLS cargo tank on ships built before July 1, 1986 must meet the following:

(a) Unless the tank meets the interim standard provided by paragraph (b) of this section and is prewashed in accordance with § 153.1118, the tank must have a stripping quantity determined under § 153.1604 that is less than 0.35m^3.

(b) Before October 3, 1994, the tank may have a total NLS residue determined under § 153.1608 that is less than 1.0 m^3 or 1/3000th of the tank's capacity and an NLS residue discharge system meeting the following:

(1) The system must be capable of discharging at a rate equal to or less than Q in the following formula:

$Q = K\,U^{1.4} L^{1.6} \times 10^{-5}\ m^3/hr$

where:

K=4.3, except K=6.45 if the discharge is equally distributed between two NLS residue discharge outlets on opposite sides of the ship (see §§ 153.470(c) and 153.1126(b)).

L=ship's length in meters.

U=for a ship that is self-propelled, the minimum speed in knots specified in the approved Procedures and Arrangements Manual for discharging Category B NLS residue, but at least 7;

U=for a ship that is not self-propelled, the minimum speed in knots specified in the approved Procedures and Arrangements Manual for discharging Category B NLS residue, but at least 4.

(2) The system must have equipment capable of automatically recording—

(i) The time of day that discharge of NLS residue through the residue discharge system starts and ends; and

(ii) The dates on which discharge begins and ends unless the equipment allows a person to enter these dates on the record manually.

(3) Each system that has the capacity to exceed Q calculated in paragraph (b)(1) of this section must have equipment that—

(i) Records the NLS residue flow through the system; and

(ii) Is sufficiently accurate that its recorded values averaged over any 30 second period differ no more than 15% from the actual flow averaged over the same 30 second period.

(4) Each system that has the capacity to exceed Q calculated under paragraph (b)(1) of this section and does not automatically control the flow rate must have—

(i) Manual controls that enable the flow to be adjusted to the value of Q calculated in paragraph (b)(1) of this section and that must be moved through at least 25% of their total range of movement for the discharge rate to change from 0.5Q to 1.5Q; and

(ii) A flow rate meter located where the flow is manually controlled.

[CGD 81-101, 52 FR 7781, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.482 Stripping quantities and interim standards for Category C NLS tanks on ships built before July 1, 1986: Category C.

Unless waived under § 153.483 or § 153.491, each Category C NLS cargo tank on ships built before July 1, 1986 must meet the following:

(a) Unless the tank meets the interim standard provided by paragraph (b) of this section, the tank must have a stripping quantity determined under 3.1604 that is less than 0.95 m³.

(b) Before October 3, 1994, the tank may have a total NLS residue determined under § 153.1608 that is less than 3.0 m³ or 1/1000th of the tank's capacity.

§ 153.483 Restricted voyage waiver for Category B and C NLS tanks on ships built before July 1, 1986: Category B and C.

At its discretion the Coast Guard waives §§ 153.481 and 153.482 under this section and allows a ship to carry Category B and C NLS cargoes between ports or terminals in one or more countries signatory to MARPOL 73/78 if the ship's owner requests a waiver following the procedures in § 153.10 and includes—

(a) A written pledge to—

(1) Limit the loading and discharge of Category B and C NLS cargoes in a foreign port to those ports and terminals in countries signatory to MARPOL 73/78 and listed in accordance with paragraph (b) of this section; and

(2) Prewash the cargo tank as required under § 153.1118 after each Category B or C NLS is unloaded unless the prewash is allowed to be omitted under § 153.1114;

(b) A list of—

(1) All foreign ports or terminals at which the ship is expected to load or discharge Category B or C NLS cargo, and

(2) All foreign ports or terminals at which the ship is expected to discharge Category B or C NLS residue from the tank;

(c) An estimate of the quantity of NLS residue to be discharged to each foreign port or terminal listed under paragraph (b)(2) of this section;

(d) Written statements from the owners of adequate reception facilities in the ports and terminals listed in accordance with paragraph (b)(2) of this section who have agreed to take NLS residue from the ship, showing the amount of NLS residue each agrees to take; and

(e) A written attestation from the person in charge of each port or terminal listed in accordance with paragraph (b)(1) of this section that the administration has determined the port or terminal to have adequate reception facilities for the NLS residue.

NOTE TO § 153.483: Certificates of Inspection and any IMO Certificates issued to ships on restricted voyage waivers indicate that while the ship carries an NLS cargo or NLS residue, it is limited to voyages between the ports or terminals listed on the certificate.

[CGD 81-101, 52 FR 7781, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.484 Prewash equipment.

Unless the ship operator shows that the prewash equipment specified in this section will be available at discharge or prewash facilities or the equipment is waived under § 153.491, to have its Certificate of Inspection or Certificate of Compliance endorsed to carry a Category A NLS or a Category B or C NLS requiring viscosity or melting point information under § 153.908 (a) and (b), a ship must have the following:

(a) For the tanks that carry the NLS, a tank washing system capable of washing all interior tank surfaces except those shielded from the washing system spray by ship's structure, and consisting of a wash water supply system and—

(1) A fixed tank washing machine in each tank; or

(2) A portable tank washing machine and, if required by the Coast Guard, equipment to move it during washing and when storing.

(b) Piping, valving, and crossovers needed to arrange the cargo piping so that the wash water passes through the cargo pump and cargo piping during tank washing or discharge of tank wash water.

(c) If the approved Procedures and Arrangements Manual specifies the hot water prewash required under 153.1108, a means of supplying water to the tank washing machine under paragraph (a) of this section at—

(1) A temperature of at least 60 °C (140 °F) when it leaves the washing machine; and

(2) The flow rate needed for the washing machine jets to meet paragraph (a) of this section.

§ 153.486 Design and equipment for removing NLS residue by ventilation: Categories A, B, C, and D.

(a) If NLS residue is to be removed from a cargo tank by ventilation, in addition to the equipment required under paragraph (b) of this section the ship must have—

(1) Openings in the tank deck near the sump or suction point;

(2) If the openings required by paragraph (a)(1) of this section are insufficient, an access opening for visually determining whether liquid remains in the sump area of the cargo tank after ventilation or some other means for making this determination; and

(3) An approved Procedures and Arrangements Manual with instructions that meet § 153.490(b)(3).

(b) Unless the ship operator shows that the ventilation equipment specified in this paragraph will be available from shore when needed, if NLS residue is to be removed from a cargo tank by ventilation, in addition to the equipment required under paragraph (a) of this section the ship must have—

(1) Portable forced air ventilating equipment fitting the ventilation openings required in paragraph (a) of this section and able to ventilate the extremities of the tank to the extent prescribed in Appendix C of the IMO *Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances,* Resolution MEPC 18(22), 1985; and

(2) A connector that allows a fan or air supply to be connected to the hose connections for the tank at the manifold.

NOTE: The Clean Air Act (42 U.S.C. 7401 et *seq.*) allows states to regulate emissions from tank ventilation. There may be other regulations, both local and Federal, that affect the use of tank ventilation for safety or environmental purposes.

§ 153.488 Design and equipment for tanks carrying high melting point NLSs: Category B.

Unless waived under § 153.491, for a ship to have its Certificate of Inspection or Certificate of Compliance endorsed allowing a tank to carry a Category B NLS with a melting point of 15 °C or more, the cargo tank must have—

(a) An arrangement enabling the cargo to be heated before cargo transfer, using heat supplied by the ship or by another source; and

(b) Sides and bottom separate from the ship's side or bottom shell plating.

§ 153.490 Cargo Record Book and Approved Procedures and Arrangements Manual: Categories A, B, C, and D.

(a) Unless waived under § 153.491, to have a Certificate of Inspection or Certificate of Compliance endorsed to carry NLS cargo, a ship must have—

(1) If U.S., a Cargo Record Book published by the Coast Guard (OMB App. No. 2115-0089), or, if foreign, a Cargo Record Book having the same entries and format as Appendix 4 of Annex II; and

(2) A Procedures and Arrangements Manual meeting paragraph (b) of this section and approved by—

(i) The Coast Guard, if the ship is a United States ship or one whose Administration is not signatory to MARPOL 73/78; or

(ii) The Administration, if the ship is one whose Administration is signatory to MARPOL 73/78.

(b) Each Procedures and Arrangements Manual under paragraph (a)(2) of this section must include the following:

(1) The standard format and content prescribed in Chapter 2 and Appendix D of the IMO *Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances,* Resolution MEPC 18(22), 1985, or, for ships for which the only NLS carried is a Category D NLS and ships having a waiver under § 153.483 or § 153.491, the format and content prescribed by the Commandant (G-MTH).

(2) If the ship has a tank that carries a cargo under a waiver issued under § 153.483, procedures ensuring that—

(i) Category B and C NLSs are discharged from the tank only in the ports or terminals listed in accordance with § 153.483(b); and

(ii) The tank is prewashed after discharging each Category B or C NLS unless § 153.1114 allows the prewash to be omitted.

(3) If ventilation is used to clean a tank under § 153.1102(b)(2), ventilation procedures that meet those in Appendix C of the IMO *Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances,* Resolution MEPC 18(22), 1985.

(4) If tank cleaning agents are used, quantities to use and instructions for using the cleaning agents.

(5) If the tank has the discharge recording equipment required in § 153.481(b), procedures to ensure that no NLS residue is discharged from the tank when the recording equipment is incapacitated unless the concentration and total quantity limits for the NLS in Annex II are not exceeded.

[CGD 81-101, 52 FR 7781, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.491 Waiver of certain equipment for dedicated cargo tanks.

(a) The Coast Guard waives §§ 153.440(a)(3), 153.480, 153.481, 153.482, and 153.488 and endorses a ship's Certificate of Inspection or Certificate of Compliance allowing a cargo tank to carry a single, specific NLS cargo and no other cargo if the ship's owner—

(1) Requests a waiver following the procedures in § 153.10; and

(2) Pledges in writing that while any waiver is in effect the cargo tank will—

(i) Carry only the NLS cargo listed on the Certificate of Inspection or Certificate of Compliance;

(ii) Carry no cargo other than the NLS; and

(iii) Not be washed or ballasted unless the wash water or ballast water is discharged to a reception facility.

(b) The Coast Guard waives §§ 153.470 and 153.490(a)(2) if—

(1) The ship's owner requests a waiver following the procedures in § 153.10;

(2) The Coast Guard has issued a waiver to each of the ship's NLS cargo tanks under paragraph (a) of this section; and

(3) The ship's owner adds to the ship's operational manual any provisions for preventing NLS discharge specified by the Commandant (G-MTH) as a condition for issuing the waiver.

[CGD 81-101, 52 FR 7781, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

SPECIAL REQUIREMENTS

§ 153.500 Inert gas systems.

When Table 1 refers to this section, a cargo containment system must have a permanent inert gas system that:

(a) Maintains the vapor space of the containment system in an inert state by filling the vapor space with a gas that is neither reactive with the cargo nor flammable;

(b) Has a pressure control system that:

(1) Prevents the inert gas system from raising the cargo tank pressure to more than the relief valve setting; and

(2) Maintains at least a 3.5 kPa gauge (approx. 0.5 psig) pressure within the containment system at all times, including cargo discharge;

(c) Has storage for enough inerting gas to replace that normally lost while the tank's atmosphere is maintained in an inert condition (e.g. through tank breathing and relief valve leakage), but in no case an amount less than 5 percent of the tank's capacity when measured with the gas at −18°C (approx. 0°F) and a pressure equal to the cargo tank's relief valve setting; and

(d) Has connections for any supplemental gas supply necessary to maintain the inert gas pressure described in paragraph (b) of this section during cargo discharge.

§ 153.501 Requirement for dry inert gas.

When Table 1 refers to this section, an inert gas system for the containment system must supply inert gas containing no more than 100 ppm water.

§ 153.515 Special requirements for extremely flammable cargoes.

When Table 1 refers to this section:

(a) An enclosed space containing a cargo tank must have an inerting system that meets the requirements in § 153.500 applying to the inert gas system of a containment system;

(b) Cargo discharge pumps must be of a type that does not subject the shaft gland to the cargo under pressure or that is submerged; and

(c) The cargo tank's relief valve setting must be no less than 21 kPa gauge (approx. 3 psig).

§ 153.520 Special requirements for carbon disulfide.

A containment system carrying carbon disulfide must meet the following:

(a) Each cargo pump must be of the intank type and encased within a cylindrical well that extends from the top of the tank to a point no more than 10 cm (approx. 4 in.) above the bottom of the tank.

(b) [Reserved]

(c) The cargo piping and venting systems must be completely independent of those for other cargo.

(d) Pressure relief valves must be made of type 304 or 316 stainless steel.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21209, May 17, 1982]

§ 153.525 Special requirements for unusually toxic cargoes.

When Table 1 refers to this section a containment system must meet the following:

(a) Cargo piping and venting systems must be designed so that they can be separated from any containment system endorsed for a cargo not covered by this section.

(b) A cargo tank's relief valve setting must be not less than 21 kPa gauge (approx. 3 psig).

(c) All cargo pumps and valves located below the weatherdeck must be operable from the weatherdeck.

(d) A heat transfer system for the cargo must:

(1) Be independent of other ship service systems, except for other cargo heat transfer systems, and not enter the engine room;

(2) Be totally external to the cargo containment system; or

(3) Be approved by the Commandant (G-MTH) for use with toxic cargoes.

(e) The cargo must be separated from any bunkers by at least two bulkheads.

(f) A cargo containment system must have a vapor return connection.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21209, May 17, 1982; CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.526 Toxic vapor detectors.

(a) When Table 1 refers to this section, a tankship must have two toxic vapor detectors, at least one of which must be portable, each able to measure vapor concentrations in the range of the time weighted average (TWA) for the cargo. The portable detector may be a direct reading detector tube instrument. These vapor detectors may be combined with those required by § 153.465.

(b) When the toxic vapor detectors required by paragraph (a) of this section are not available and the cargo referenced to this section is transferred through a cargo pumproom, the tankship must meet § 153.336(b).

[CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.527 Toxic vapor protection.

When Table 1 refers to this section, a tankship must have on board for each crew member:

(a) An emergency escape breathing apparatus (EEBA) approved by the Mining Safety and Health Administration (formerly the Mining Enforcement and Safety Administration) and the National Institute for Occupational Safety and Health, or the tankship's flag administration.

(b) Where the emergency escape breathing apparatus does not protect the eyes from vapors, a set of goggles that either:

(1) Meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1(1979); or

(2) Are approved by the tankship's flag administration.

[CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.530 Special requirements for alkylene oxides.

When Table 1 refers to this section, a containment system must meet the following:

(a) Except as provided in paragraphs (b) and (c) of this section, a cargo containment system must be made of:

(1) Stainless steel other than types 416 and 442; and

(2) Steel.

(b) Except as provided in paragraph (c) of this section, gaskets must be composites of spirally wound stainless steel and Teflon or similar flourinated polymer.

(c) The Commandant (G-MTH) approves a cargo containment system using materials other than those described in this section for alkylene oxides on a case by case basis if:

(1) The person wishing to have the containment system approved completes any tests prescribed by the Commandant (G-MTH); and

(2) The Commandant (G-MTH) approves the results of the tests and the material for use with alkylene oxides.

(d) The following materials are generally found unsatisfactory for gaskets, packing, insulation, and similar uses in alkylene oxide containment systems and would require extensive testing as described in paragraph (c) of this section before being approved:

(1) Neoprene or natural rubber if it might be in contact with the alkylene oxide.

(2) Asbestos or asbestos mixed with other materials such as with many common insulations, packing materials, and gasket materials.

(3) Materials containing oxides of magnesium, such as mineral wools.

(e) The tank's relief valve setting must not be less than 21 kPa gauge (approx. 3 psig).

(f) If the containment system is equipped with a cooling system, the cooling system must:

(1) Not compress the cargo; and

(2) Regulate the cargo temperature automatically and allow manual regulation.

(g) The cargo piping system must:

(1) Comply with Part 38 of this chapter;

(2) Be completely separate from all other systems;

(3) Be assembled from valves, fittings, and accessories having a pressure rating of not less than 1030 kPa gauge (approx. 150 psig) (American National Standards Institute); and

(4) Have no threaded joints.

(h) The cargo containment system vapor space and each space listed in paragraphs (k) and (l) of this section must have continuous monitoring of oxygen concentration or have an arrangement to enable sampling with a portable oxygen analyzer.

(i) Valve disks or disk faces, seats, and other wearing valve parts must be made of stainless steel containing no less than 11 percent chromium.

(j) The venting system must be independent of other containment or tankship systems.

(k) When a cargo tank is in an enclosed space, the space must have:

(1) An inert gas system meeting the requirements that apply to the inert gas system of a containment system in § 153.500, or

(2) A forced ventilation system meeting the requirements that apply to a cargo handling space ventilation system in § 153.312.

(l) Cofferdams, cargo tanks, double bottom spaces, void spaces and other enclosed spaces adjacent to an integral cargo tank must have an inert gas system meeting the requirements that apply to the inert gas system of a containment system in § 153.500.

(m) An intank pump or inert gas displacement must be used to discharge cargo.

(n) The cargo discharge piping system must have a remotely actuated quick closing shutoff valve that meets § 153.284 at the cargo transfer hose connection.

(o) Cargo hose must: (1) Have the specific approval of the Commandant (G-MTH) for use in alkylene oxide transfer; and

(2) Be marked "For Alkylene Oxide Transfer Only".

(p) All exposed parts of the cargo containment system above or on the deck, such as tank domes, cargo piping, and loading manifolds, must be covered by a water spray system that:

(1) Operates automatically in a fire involving the cargo containment system;

(2) Has at least two remote manual actuators, one in each emergency shutdown station required by § 153.296; and

(3) Covers the area of application with a uniform spray of

$$0.175\ \text{l/m}^2\ \text{sec}\ (0.0043\ \text{gal/ft}^2\ \text{sec}).$$

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21210, May 17, 1982; CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 82-063b, 48 FR 39629, Sept. 1, 1983; CGD 81-078, 50 FR 21174, May 22, 1985]

§ 153.545 Special requirements for liquid sulfur.

(a) A containment system carrying liquid sulfur must have:

(1) A cargo tank ventilation system that:

(i) Maintains the H_2S vapor concentration below 1.85 percent by volume; and

(ii) Prevents sulfur buildup within itself; and

(2) An alarm system designed to operate when the ventilation system blower fails.

(b) The void spaces around a cargo tank that carries liquid sulfur must be oil tight.

(c) A cargo tank that carries liquid sulfur and the void spaces surrounding the tank must have connections for sampling vapor.

§ 153.554 Special requirements for acids.

When Table 1 refers to this section:

(a) Each containment system loading and discharge connection must have a spray shield;

(b) Each cargo containment system must be separated from bunkers by double walls, such as a cofferdam and piping tunnels; and

(c) Each vessel must have on board a means to determine whether cargo has leaked into the spaces adjacent to a cargo containment system.

§ 153.555 Special requirements for inorganic acids.

When Table 1 refers to this section, a tankship's shell plating must not be a part of the cargo tank.

[CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.556 Special requirements for sulfuric acid and oleum.

(a) Except as prescribed in paragraphs (b) and (c) of this section, containment systems carrying sulfuric acid, oleum, or contaminated sulfuric acid are approved by the Commandant (G-MTH) on a case by case basis.

(b) A containment system carrying sulfuric acid may be:

(1) Made of unlined steel if the cargo composition is between 70 and 80 or between 90 and 100 percent acid by weight;

(2) Lined with lead if the cargo composition does not exceed 96 percent acid by weight; or

(3) Lined with natural rubber or neoprene if the cargo composition does not exceed 51 percent acid by weight.

(c) A containment system for oleum may be of unlined steel if the concentration of free sulfur trioxide in the oleum exceeds 20 percent by weight.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.557 Special requirements for hydrochloric acid.

(a) A containment system that carries hydrochloric acid must be lined with:

(1) Natural rubber;

(2) Neoprene; or

(3) A material approved for hydrochloric acid tanks by the Commandant (G-MTH).

(b) Containment systems for contaminated hydrochloric acid are approved by the Commandant (G-MTH) on a case by case basis.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4781, Feb. 3, 1983]

§ 153.558 Special requirements for phosphoric acid.

A phosphoric acid containment system must be:

(a) Lined with natural rubber or neoprene;

(b) Lined with a material approved for phosphoric acid tanks by the Commandant (G-MTH); or

(c) Made of a stainless steel that resists corrosion by phosphoric acid.

NOTE: "Phosphoric acid", as defined in § 153.2, includes phosphoric acid, superphosphoric acid, and aqueous solutions of phosphoric acid.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 88-100, 54 FR 40042, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 153.559 Special requirements for nitric acid (less than 70 percent).

A containment system that carries nitric acid (less than 70 percent) must be of stainless steel that resists corrosion by nitric acid.

§ 153.560 Special requirements for octyl nitrates.

(a) The carriage temperature of octyl nitrates must be maintained below 100°C (212°F) in order to prevent the occurrence of a self-sustaining exothermic decomposition reaction.

(b) Octyl nitrates may not be carried in a deck tank unless the tank has a combination of insulation and a water deluge system sufficient to maintain the tank's cargo temperature below 100°C (212°F) and the cargo temperature rise at below 1.5°C(2.7°F)/hour, for a fire of 650°C (1200°F).

[CGD 88-100, 54 FR 40042, Sept. 29, 1989, as amended by 55 FR 17276, Apr. 24, 1990]

§ 153.602 Special requirements for cargoes reactive with water.

When Table 1 refers to this section, the air inlet to the pressure-vacuum valve for the cargo tank must be located at least 2m (approx. 6.6 ft) above the weatherdeck.

[CGD 78-128, 47 FR 21210, May 17, 1982]

TESTING AND INSPECTION

§ 153.806 Loading information.

Each tankship must have a manual containing information that enables the master to load and ballast the tankship while keeping structural stresses within design limits.

[CGD 79-023, 48 FR 51009, Nov. 4, 1983]

§ 153.808 Examination required for a Certificate of Compliance.

Before a vessel receives either an initial or a reissued Certificate of Compliance endorsed with the name of a cargo from Table 1 of this part, the vessel must call at a U.S. port for an examination during which the Officer in Charge, Marine Inspection, determines whether or not the vessel meets the requirements of this chapter.

[CGD 81-052, 50 FR 8733, Mar. 5, 1985]

§ 153.809 Procedures for having the Coast Guard examine a vessel for a Letter of Compliance.

To have the Coast Guard examine the vessel for a Certificate of Compliance, as required in § 153.808, the owner of a foreign flag vessel must proceed as follows:

(a) After making application pursuant to § 153.9, await notification by the Commandant (G-MTH) that review of the vessel's plans or IMO Certificate is complete.

(b) Except when paragraph (c) of this section applies,

(1) After receiving notification from Commandant (G-MTH) that review is complete and the application is accept-

able, dispatch the vessel to a United States port;

(2) Notify the Officer in Charge, Marine Inspection, for the port where the vessel is to be inspected at least seven days before the vessel arrives and arrange the exact time and other details of the examination. This notification is in addition to any other prearrival notice to the Coast Guard required by other regulations and must include:

(i) The name of the vessel's first U.S. port of call;

(ii) The date the vessel is scheduled to arrive;

(iii) The name and telephone number of the owner's local agent; and

(iv) The names of all cargoes listed in Table 1 of this part that are on board the vessel;

(3) Make sure that the following plans are available on board the vessel for the use of the Marine Inspector before beginning the examination required by § 153.808:

(i) A general arrangement (including the location of firefighting, safety, and lifesaving gear);

(ii) A capacity plan;

(iii) A schematic diagram of cargo piping on deck and in tanks (including the location of all valves and pumps); and

(iv) A schematic diagram of cargo tank vent piping (including the location of relief valves and flame screens).

(c) If the vessel was accepted for U.S. service on the basis of Coast Guard plan review under § 153.9(b), the vessel owner shall notify Commandant (G-MTH) fourteen days prior to the vessel's arrival at a U.S. port. This notification must include:

(1) The name of the vessel's first U.S. port of call;

(2) The date the vessel is scheduled to arrive;

(3) The name and telephone number of the owner's local agent; and

(4) The names of all cargoes listed in Table 1 of this part that are on board the vessel.

(d) If the vessel is not to carry a cargo under § 153.811, allow at least 14 calendar days from the time the Commandant (G-MTH) receives the request for an examination until the date of the vessel's examination.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 82-063b, 48 FR 39629, Sept. 1 1983; CGD 81-052, 50 FR 8733, Mar. 5, 1985; 50 FR 15895, Apr. 23, 1985]

§ 153.812 Inspection for Certificate of Inspection.

The rules governing the issuance of Certificates of Inspection are contained in Part 31 of this chapter.

Subpart C—Operations

DOCUMENTS AND CARGO INFORMATION

§ 153.900 Certificates and authorization to carry a bulk liquid hazardous material.

(a) Except as allowed in 33 CFR 151.33(a), no ship may carry a cargo of bulk liquid hazardous material or an NLS residue if the bulk liquid hazardous material or NLS is listed in Table 1 or carried under a written permission under paragraph (d) of this section unless the ship meets the following:

(1) The cargo must be carried in a cargo tank.

(2) If a United States ship, the ship must have a Subchapter D or I Certificate of Inspection that is endorsed to allow the cargo tank to carry the cargo.

(3) If a foreign ship, the ship must have a Certificate of Compliance that is endorsed to allow the cargo tank to carry the cargo.

(4) The ship must have an IMO Certificate of Fitness issued under § 153.12 that is endorsed to allow the cargo tank to carry the cargo if it is—

(i) A United States self-propelled ship in foreign waters; or

(ii) A United States non-self-propelled ship in the waters of another Administration signatory to MARPOL 73/78 and the cargo is a Category A, B, or C NLS.

(b) [Reserved]

(c) No ship may carry any bulk liquid cargo not listed in § 30.25-1 of this chapter, Table 151.05 of Part 151 of this chapter, Table 1 or Table 2 of this part, Table 4 of Part 154 of this chapter, 33 CFR 151.47, or 33 CFR

151.49 unless the cargo name is endorsed on the Certificate of Inspection or contained in a letter issued under paragraph (d) of this section.

(d) The Coast Guard at its discretion endorses the Certificate of Inspection with the name of or issues a letter allowing the carriage of an unlisted cargo described under paragraph (c) of this section if—

(1) The shipowner—

(i) Requests the Coast Guard to add the cargo; and

(ii) Supplies any information the Coast Guard needs to develop carriage requirements for the bulk liquid cargo; and

(2) The ship—

(i) Has a Certificate of Inspection, Certificate of Compliance, or IOPP Certificate as specified in this part;

(ii) Meets the design and equipment requirements of this part specified by the Coast Guard; and

(iii) Meets any additional requirements made by the Coast Guard.

[CGD 81-101, 52 FR 7783, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.901 Documents: Posting, availability, and alteration.

(a) No person may operate a United States ship unless the endorsed Certificate of Inspection is readily available on the ship.

(b) No person may operate a foreign ship unless the endorsed Certificate of Compliance or Certificate of Inspection is readily available on the ship.

(c) No person may operate a ship under an alternative or waiver granted under this part unless the document granting the alternative or waiver is attached to the ship's Certificate of Inspection or Certificate of Compliance.

(d) Except as allowed in paragraph (e) of this section, the Coast Guard does not accept the following if altered:

(1) Certificates of Inspection.

(2) Certificates of Compliance.

(3) Certificates of Fitness, unless the alteration is by the issuing authority.

(4) Approved Procedures and Arrangements Manuals, unless the alteration is approved by the issuing authority.

(5) NLS Certificates.

(e) A person wishing to change a Procedures and Arrangements Manual approved by the Coast Guard must submit a copy to the Coast Guard following the procedures for requesting an endorsed Certificate of Inspection in § 153.8.

[CGD 81-101, 52 FR 7783, Mar. 12, 1987]

§ 153.902 Expiration and invalidation of the Certificate of Compliance.

(a) The Certificate of Compliance shows its expiration date.

(b) The endorsement of a Certificate of Compliance under this part is invalid if the ship's IMO Certificate expires or becomes invalid.

(c) The Coast Guard reinstates, at its discretion, the endorsement on a Certificate of Compliance invalidated under paragraph (b) of this section if the ship's owner submits a copy of the IMO Certificate to the Commandant (G-MTH) after the IMO Certificate is revalidated or reissued.

NOTE: See § 153.809 for procedures for having a Certificate of Compliance reissued.

[CGD 81-101, 52 FR 7784, Mar. 12, 1987]

§ 153.903 Operating a United States ship in special areas: Categories A, B, and C.

No person may operate a United States ship that carries an NLS or NLS residue in a special area unless—

(a) The ship's Certificate of Inspection is endorsed in accordance with § 153.30; and

(b) The ship meets the operating requirements applying to special areas in Regulations 5, 5A, 8 and the Standards for Procedures and Arrangements of Annex II.

[CGD 81-101, 52 FR 7784, Mar. 12, 1987]

§ 153.904 Limitations in the endorsement.

No person may operate a tankship unless that person complies with all limitations in the endorsement on the tankship's Certificate of Inspection or Certificate of Compliance.

[CGD 81-052, 50 FR 8734, Mar. 5, 1985]

§ 153.905 Regulations required to be on board.

No person may operate a tankship unless the most recent editions of this part, and parts 35 and 150 of this chapter are on board.

[CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.907 Cargo information.

(a) The master shall ensure that the following information for each cargo carried under this part is readily available to those on the tankship engaged in cargo operations:

(1) The name of the cargo as listed in table 1.

(2) A description of the cargo's appearance and color.

(3) Hazards in handling the cargo.

(4) Any special handling procedures for the cargo, such as inerting.

(5) Procedures to follow if the cargo spills or leaks.

(6) Procedures for treating a person exposed to the cargo.

(7) A list of fire fighting procedures and extinguishing agents effective with cargo fires.

(8) Shipper's name.

(9) Loading point.

(10) Approximate quantity of cargo.

(11) Tank in which the cargo is located.

(12) The name of an agent in the United States authorized to accept service of legal process for the vessel.

(b) The master shall make sure that the following information for cargoes other than those carried under this part is readily available on the tankship:

(1) The name of the cargo as listed in Table 4 of Part 154 of this chapter or § 30.25-1 of this chapter if the cargo is listed in one of these two tables.

(2) The name of the cargo prescribed in the letter authorizing carriage of the cargo under § 153.900(d) if the cargo is a hazardous or flammable cargo authorized for carriage under that section.

(3) The shipper's name for the cargo and the name of the shipper if the cargo is neither a hazardous nor flammable cargo.

[CGD 81-078, 50 FR 21174, May 22, 1985; as amended by CGD 88-100, 54 FR 40042, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 153.908 Cargo viscosity and melting point information; measuring cargo temperature during discharge: Categories A, B, and C.

(a) The person in charge of the ship may not accept a shipment of a Category A, B, or C NLS cargo having a reference to this paragraph in the "Special Requirements" column of Table 1 unless the person has, from the cargo's manufacturer or the person listed as the shipper on the bill of lading, a written statement of the following:

(1) For Category A or B NLS, the cargo's viscosity at 20 °C in mPa.s and, if the cargo's viscosity exceeds 25 mPa.s at 20 °C, the temperature at which the viscosity is 25 mPa.s.

(2) For Category C NLS, the cargo's viscosity at 20 °C in mPa.s and, if the cargo's viscosity exceeds 60 mPa.s at 20 °C, the temperature at which the viscosity is 60 mPa.s. If the cargo's viscosity varies from shipment to shipment, the maximum viscosity and maximum temperature values may be supplied.

(b) The person in charge of the ship may not accept a shipment of a Category A, B, or C cargo having a reference to this paragraph in the "Special Requirements" column of Table 1 unless the person has a written statement of the cargo's melting point in °C from the cargo's manufacturer or the person listed as the shipper on the bill of lading. If the cargo's melting point varies from shipment to shipment, the highest melting point may be supplied.

(c) The person in charge of the ship shall ensure that the cargo temperature is read and recorded in the Cargo Record Book following the procedures in paragraph (d) of this section when a cargo having a reference to paragraph (a) or (b) of this section in the "Special Requirements" column of Table 1 is unloaded.

(d) The cargo temperature measured in paragraph (c) of this section must be made using the following procedure:

(1) Each reading must be made with the sensor or thermometer required by § 153.440(a)(3) or (c). If a portable thermometer is used, it must be locat-

ed as prescribed for the temperature sensor in § 153.440(a)(3).

(2) A total of 2 readings must be made, the first reading to be made no more than 30 minutes after cargo transfer begins and the second reading no more than 30 minutes before the main cargo pump is shut down.

(3) The cargo's temperature is the average of the 2 readings made under paragraph (d)(2) of this section.

[CGD 81-101, 52 FR 7784, Mar. 12, 1987]

§ 153.909 Completing the Cargo Record Book and record retention: Categories A, B, C, and D.

(a) The person in charge of a ship shall ensure that the Cargo Record Book required under § 153.490 is completed immediately after any of the following occurs:

(1) An NLS cargo is loaded.

(2) An NLS cargo is transferred between tanks on a ship.

(3) An NLS cargo is unloaded from a tank.

(4) A tank that last carried an NLS cargo is prewashed under this part.

(5) A tank that last carried an NLS cargo is washed, except as reported under paragraph (a)(4) of this section, cleaned, or ventilated.

(6) Washings from a tank that last carried an NLS cargo are discharged to the sea.

(7) Tanks that last carried an NLS cargo are ballasted.

(8) Ballast water is discharged to the sea from a cargo tank that last carried an NLS.

(9) An NLS cargo or NLS residue is discharged to the sea by accident or except as allowed by this part.

(10) A Surveyor is present during an operation that this part requires the presence of a Surveyor.

(11) NLS residue or NLS cargo is transferred from cargo pumproom bilges or transferred to an incinerator.

(12) A waiver is issued to the ship, ship owner, ship operator, or person in charge of the ship under this part.

(13) The concentration of a Category A NLS residue is measured under § 153.1120(a).

(14) Any discharge recording equipment required by § 153.481(b)(2) fails.

(b) The person in charge of the ship shall ensure that the Cargo Record Book is on board and readily available for inspection and copying by the Coast Guard and when the ship is a U.S. ship in the waters of a foreign country whose Administration is signatory to MARPOL 73/78, the authorities of that country.

(c) Each officer in charge of an operation listed under paragraph (a) of this section, and each Surveyor observing an operation that this part requires the presence of a Surveyor, shall attest to the accuracy and completeness of each Cargo Record Book entry concerning those operations by signing after each entry.

(d) After all the entries on a page of the Cargo Record Book are completed, and if the person in charge of the ship agrees with the entries, the person in charge of the ship shall sign the bottom of that page.

(e) The ship owner or operator shall ensure that—

(1) Each Cargo Record Book is retained on board the ship for at least 3 years after the last entry; and

(2) Each discharge recording required by § 153.1126(b)(1) is retained on board the ship for at least three years.

[CGD 81-101, 52 FR 7784, Mar. 12, 1987]

§ 153.910 Cargo piping plan.

No person may operate a tankship unless the tankship has a cargo piping plan that:

(a) Shows all cargo piping on the tankship;

(b) Shows all cargo valving, pumps, and other equipment that is used during cargo transfer;

(c) Shows the cargo tanks;

(d) Shows any modifications necessary to a containment system that is to be separated as prescribed under Part 150 of this subchapter, or §§ 153.525 and 153.1020;

(e) Emphasizes the piping and equipment described in paragraphs (a), (b) and (d) of this section by using contrasting colors, line widths, or similar methods; and

(f) Shows the cargo loading rates chosen under § 153.365(b) for all applicable cargo lines.

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[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.912 Certificate of inhibition or stabilization.

(a) When a cargo in Table 1 is referred to this section, no person may operate a tankship carrying the cargo without a written certification, carried on the bridge of the tankship, from the shipper that the cargo is:

(1) Inhibited; or

(2) Stabilized.

(b) The certification required by this section must contain the following information:

(1) Whether the cargo is inhibited or stabilized.

(2) The name and concentration of the inhibitor or stabilizer.

(3) The date the inhibitor or stabilizer was added.

(4) The length of time the inhibitor or stabilizer is effective.

(5) Any temperature limitations qualifying the inhibitor's or stabilizer's effective lifetime.

(6) The action to be taken should the duration of the voyage exceed the inhibitor's or stabilizer's useful life.

GENERAL CARGO OPERATIONAL REQUIREMENTS

§ 153.920 Cargo quantity limitations.

(a) No person may load a cargo tank or operate a tankship that carries a cargo tank containing in excess of 1250 m^3 (approx. 44,138 ft^3) of cargo requiring a type I containment system.

(b) No person may load a cargo tank or operate a tankship that carries a cargo tank containing in excess of 3000 m^3 (approx. 105,932 ft^3) of a cargo requiring a type II containment system.

§ 153.921 Explosives.

No person may load, off-load, or carry a cargo listed in this part on board a vessel that carries explosives unless he has the prior written permission of the Commandant (G-MTH).

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.923 Inerting systems.

The master shall ensure that the inert gas systems for any cargo that this part requires to be inerted are operating correctly.

GENERAL VESSEL SAFETY

§ 153.930 Cargo antidotes.

No person may operate a tankship that carries a cargo listed in Table 1 unless the tankship has on board the antidotes described for the cargo in the *Medical First Aid Guide for Use in Accidents Involving Dangerous Goods* published by IMO.

§ 153.931 Obstruction of pumproom ladderways.

The master shall ensure that all cargo pumproom ladderways are unobstructed at all times.

§ 153.932 Goggles and protective clothing.

(a) The master shall ensure that each person wear a face mask or tight-fitting goggles for eye protection against splashing or spraying liquids if that person is:

(1) Sampling cargo;

(2) Transferring cargo;

(3) Making or breaking a cargo hose connection;

(4) Gauging a cargo tank; or

(5) Opening a cargo tank by opening a Butterworth hatch, ullage hatch, cargo tank hatch, or similar opening.

(b) The master shall ensure that each person wear a face mask or tight-fitting goggles for eye protection against splashing or spraying liquids if the person is:

(1) In the area of the deck where the cargo tanks, cargo piping, and cargo pumprooms are located while a cargo transfer is taking place; or

(2) In a cargo pumproom, an enclosed space adjacent to a cargo tank, or a space containing part of a cargo containment system.

(c) The master shall ensure that each person in paragraphs (a) and (b) of this section wear any additional protective clothing the master believes necessary to protect the person from the cargo's hazards.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.933 Chemical protective clothing.

When table 1 refers to this section, the following apply:

(a) The master shall ensure that the following chemical protective clothing constructed of materials resistant to permeation by the cargo being handled is worn by all personnel engaged in an operation listed in paragraph (b) of this section:

(1) Splash protective eyewear.

(2) Long-sleeved gloves.

(3) Boots or shoe covers.

(4) Coveralls or lab aprons.

NOTE: "Guidelines for the Selection of Chemical Protective Clothing", Third Edition, 1987, available from the American Conference of Governmental Industrial Hygienists, 6500 Glenway Ave., Cincinnati, OH 45211-4438, provides information on the proper clothing for the cargo being handled.

(b) This section applies during the following operations:

(1) Sampling cargo.

(2) Transferring cargo.

(3) Making or breaking cargo hose connections.

(4) Gauging a cargo tank, unless gauging is by closed system.

(5) Opening cargo tanks.

(c) Coveralls or lab aprons may be replaced by splash suits or aprons constructed of light weight or disposable materials if, in the judgment of the master—

(1) Contact with the cargo being handled is likely to occur only infrequently and accidentally; and

(2) The splash suit or apron is disposed of immediately after contamination.

(d) Splash protective eyewear must be tight-fitting chemical-splash goggles, face shields, or similar items intended specifically for eye protection from chemical splashing or spraying.

(e) The master shall ensure that each person in the vicinity of an operation listed in paragraph (b) of this section or in the vicinity of tanks, piping, or pumps being used to transfer the cargo wears splash protective eyewear under paragraph (d) of this section.

[CGD 88-100, 54 FR 40042, Sept. 29, 1989]

§ 153.934 Entry into spaces containing cargo vapor.

(a) No person may enter a cargo tank, cargo handling space, pumproom or enclosed space in the cargo area without the permission of the master.

(b) Before permitting anyone to enter a cargo tank, cargo handling space, pumproom or other enclosed space in the cargo area, the master shall make sure that:

(1) The space is free of toxic vapors and has sufficient oxygen to support life; or

(2) Those entering the space wear protective equipment with self-contained breathing apparatus as described in § 153.214(b) and an officer closely supervises the entire operation.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.935 Opening of tanks and cargo sampling.

(a) Except as provided in paragraph (b) of this section, the master shall ensure that all cargo tank hatches, ullage openings, and tank cleaning openings are tightly closed at all times.

(b) The master may not authorize the opening of a cargo tank, except:

(1) To clean a tank;

(2) To transfer a cargo that Table 1 allows in a containment system having an open gauging system;

(3) To sample a cargo that Table 1 allows in a containment system having an open gauging system; or

(4) To sample a cargo that Table 1 allows in a containment system having a restricted gauging system if:

(i) The tank is not being filled during sampling;

(ii) The vent system has relieved any pressure in the tank;

(iii) The person sampling the cargo wears the protective clothing required during cargo transfer; and

(iv) The tank is closed tightly following sampling.

(c) The master shall make sure that cargoes requiring closed gauging are sampled only through the controlled sampling arrangement required by § 153.404(d).

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21210, May 17, 1982]

§ 153.935a Storage of cargo samples.

(a) The master shall make sure that any cargo samples are stored in:

(1) A designated and ventilated space in the cargo area of the vessel; or

(2) An area approved by the Commandant (G-MTH) or the tankship's flag administration for the stowage of cargo samples.

(b) The master shall make sure that cargo sample bottles are stored:

(1) In a way that prevents shifting of the sample bottles when the vessel is at sea;

(2) In bins or containers constructed of materials that are resistant to the cargo samples; and

(3) Apart from other sample bottles containing incompatible liquids (See Part 150, Subpart A).

[CGD 78-128, 47 FR 21211, May 17, 1982, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.936 Illness, alcohol, drugs.

The master shall ensure that no person participates in cargo related operations who appears to be intoxicated by alcohol or drugs or to be so ill as to be unfit for the particular operation.

MARKING OF CARGO TRANSFER HOSE

§ 153.940 Standards for marking of cargo hose.

No person may mark a hose assembly as meeting the standards of this section unless the hose assembly meets the following requirements:

(a) Each hose assembly must have:

(1) Fully threaded connections;

(2) Flanges that meet standard B16.5, *Steel Pipe Flanges and Flange Fittings*, or standard B16.31, *Nonferrous Pipe Flanges*, of the American National Standards Institute; or

(3) Quick-connect couplings that are acceptable to the Commandant (G-MTH).

(b) Each hose assembly must be marked with the:

(1) Date of manufacture;

(2) Working pressure described in paragraph (d) of this section;

(3) Date of the last test made as prescribed in paragraph (e) of this section; and

(4) Manufacturer's recommended maximum and minimum temperatures.

(c) A cargo hose assembly must have a minimum bursting pressure as stated by the manufacturer of at least 5152 kPa gauge (approx. 750 psig).

(d) The working pressure marked on a hose must meet the following:

(1) Be at least 1030 kPa gauge (approx. 150 psig).

(2) Not exceeded 20 per cent (one-fifth) of the manufacturer's stated bursting pressure.

(3) Not exceed the manufacturer's recommended working pressure.

(4) Not exceed the test pressure used in the latest test under paragraph (e)(3) of this section.

(e) A cargo hose assembly must be inspected and tested by placing it in a straight, horizontal position so that its entire external surface is accessible. It must be ascertained that the hose assembly:

(1) Has no loose covers, kinks, bulges, soft spots, and no gouges, cuts, or slashes that penetrate any hose reinforcement;

(2) Has no external and, to the extent internal inspection is possible with both ends of the hose open, no internal deterioration; and

(3) Does not burst, bulge, leak, or abnormally distort under static liquid pressure at least as great as the recommended working pressure.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21211, May 17, 1982; CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

CARGO TRANSFER PROCEDURES

§ 153.953 Signals during cargo transfer.

The master shall ensure that:

(a) The tankship displays a red flag in the day and a red light at night when transferring cargo while fast to a dock;

(b) The tankship displays a red flag when transferring cargo while at anchor; and

(c) The red flag or the red light is visible from all sides of the tankship.

§ 153.955 Warning signs during cargo transfer.

(a) When transferring cargo while fast to a dock or at anchor in port, the master shall ensure that the tankship displays a warning sign at the gangway facing the shore so that it may be seen from the shore and another warning sign facing outboard toward the water so that it may be seen from the water. (See figure 1).

(b) Except as provided in paragraph (f) of this section, each warning sign must have the following legends:

(1) Warning.

(2) Dangerous Cargo.

(3) No Visitors.

(4) No Smoking.

(5) No Open Lights.

(c) Each letter must be block style, black on a white background.

(d) Each letter must:

(1) Be 7.5 cm (approx. 3 in.) high;

(2) Be 5 cm (approx. 2 in.) wide except for "M" and "W" which must be 7.5 cm (approx. 3 in.) wide and the letter "I" which may be 1.3 cm (approx. ½ in.) wide; and

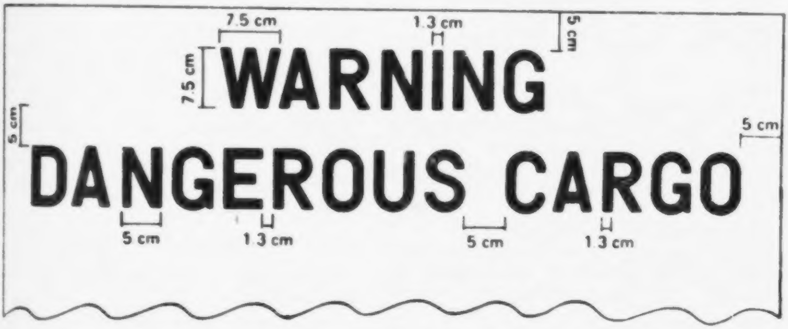

Figure 1 - Minimum Dimensions for Warning Sign

(3) Have 1.3 cm (approx. ½ in.) stroke width.

(e) The spacing must be:

(1) 1.3 cm (approx. ½ in.) between letters of the same word;

(2) 5 cm (approx. 2 in.) between words;

(3) 5 cm (approx. 2 in.) between lines; and

(4) 5 cm (approx. 2 in.) at the borders of the sign.

(f) Except as described in § 153.1045, the legends "No Smoking" and "No Open Lights" are not required when the cargoes on board the tankship are neither flammable nor combustible.

§ 153.957 Person in charge of cargo transfer.

(a) The master of a U.S. flag tankship shall ensure that cargo transfer operations are supervised by a person designated as a person in charge of cargo transfer under 33 CFR 155.710.

(b) No person may serve, and no one may use the services of a person as a person in charge of cargo transfer on a foreign flag tankship unless the person:

(1) Holds a valid document issued by the flag administration authorizing service as a person in charge of cargo transfer aboard the vessel that is transferring cargo;

(2) Is designated by the master;

(3) Is readily able to communicate in English with the person in charge of cargo transfer at the transfer facility either directly or through an interpreter who is available to him during the transfer; and

(4) Has studied and understands his responsibilities as described in this subchapter.

§ 153.959 Approval to begin transfer operations required.

No person may make connections for cargo transfer or transfer cargo unless he has authorization from the person in charge of cargo transfer.

§ 153.964 Discharge by gas pressurization.

The person in charge of cargo transfer may not authorize cargo discharge by gas pressurization unless:

(a) The tank to be offloaded has an SR or PV venting system;

(b) The pressurization medium is either the cargo vapor or a nonflammable, nontoxic gas inert to the cargo; and

(c) The pressurizing line has:

(1) A pressure reducing valve whose setting does not exceed 90% of the tank's relief valve setting and a manual control valve between the pressure reducing valve and the tank; or

(2) For an inert gas medium:

(i) A safety relief valve with a cross sectional flow area at least equal to that of the pressurizing line and whose relieving pressure does not exceed 90 percent of the tank's relief valve setting;

(ii) A manual control valve between the safety relief valve and the tank; and

(iii) A check valve between the manual control valve and the tank.

§ 153.966 Discharge by liquid displacement.

The person in charge of cargo transfer may not authorize cargo discharge by liquid displacement unless the liquid supply line to the tank has:

(a) A safety relief or pressure reducing valve set to operate at no more than 80 percent of the tank's relief valve setting; and

(b) A manual control valve between the tank and the supply line's safety relief valve or pressure reducing valve.

§ 153.968 Cargo transfer conference.

(a) Before he may begin making connections for cargo transfer, the person in charge of cargo transfer shall confer with the person supervising the cargo transfer at the facility.

(b) The person in charge of cargo transfer shall discuss the important aspects of the transfer operation, such as the following, with the supervisor at the facility:

(1) The products to be transferred.

(2) The cargo loading rates marked on the cargo piping plan or the maximum safe transfer rates.

(3) The critical or hazardous stages of the transfer operation.

(4) The emergency procedures in case of a spill.

(5) If the vessel is equipped with the tank overflow alarm prescribed in § 153.408(c), a procedure for shutdown of shore pumps, shore valves, and ship's valves that prevents piping system pressures from exceeding those for which the piping system is designed.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21211, May 17, 1982; CGD 81-078, 50 FR 21174, May 22, 1985]

§ 153.970 Cargo transfer piping.

The person in charge of cargo transfer shall ensure that:

(a) Cargo is transferred to or from a cargo tank only through the tankship's cargo piping system;

(b) Vapor not returned to shore through the tankship's vapor return system is discharged at the height required for the cargo's vent riser in Table 1, and

(c) All cargo vapor is returned to shore through the valved connection on the venting system if:

(1) The cargo requires closed gauging, is referenced to § 153.372 or is referenced to § 153.525;

(2) The transfer terminal has vapor return equipment; and

(3) In his estimation the vapor return equipment is adequate to handle the vapor expected from the tank.

§ 153.972 Connecting a cargo hose.

The person in charge of cargo transfer may not authorize the connection of a hose to a cargo containment system unless:

(a) He has ensured himself that the cargo will not weaken or damage the hose;

(b) The hose is marked as meeting the standards of § 153.940;

(c) The date of the hose's last pressure test is within one year of the date on which the hose is used to transfer cargo;

(d) The recommended working pressure marked on a hose used for discharge meets or exceeds the working pressure marked on the cargo piping at the hose connection; and

(e) The cargo's temperature is within the manufacturer's recommended maximum and minimum hose temperatures.

§ 153.975 Preparation for cargo transfer.

The person in charge of cargo transfer may not approve or continue cargo transfer unless the following conditions are met:

(a) No fires or open flames are on deck or in compartments near the hose connections when Table 1 requires the cargo's containment system to have a fire protection system.

(b) Any electrical bonding of the tankship to the transfer facility is made before the cargo transfer piping is joined.

(c) Any supplemental inert gas supply necessary to maintain the 3.5 kPa gauge (approx. 0.5 psig) pressure in the tank during offloading (see § 153.500) is connected to the inert gas pressure control system.

(d) The transfer connections have enough slack to allow for vessel movement.

(e) The transfer connections are supported by tackles.

(f) The cargo high level alarms, tank overflow alarms and overflow control systems are functioning correctly when the cargo is loaded.

(g) Joints and couplings are gasketed and mated tightly.

(h) Flanges are bolted tightly.

(i) No repair work is underway in areas where cargo or cargo vapors may collect.

(j) Cargo and sea valves are properly set, with those sea valves connected to cargo piping lashed or sealed shut.

(k) Venting system bypass valves are set for cargo transfer and are operating properly.

(l) All scuppers are plugged.

(m) Smoking is limited to safe places.

(n) Fire fighting and safety equipment is ready.

(o) He is in effective communication with the transfer terminal.

(p) The person in charge of the transfer terminal has acknowledged that he is ready to transfer.

(q) Pressures within the cargo transfer and containment systems do not exceed the pressure ranges for which the transfer hose and containment systems are designed.

(r) No vessels that would hazard cargo transfer are alongside the tankship.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21211, May 17, 1982]

§ 153.976 Transfer of packaged cargo or ship's stores.

The person in charge of cargo transfer may neither begin nor continue the transfer of a flammable or combustible cargo while packaged cargo or ship's stores are transferred unless transfer of the packaged cargo or ship's stores does not hazard transfer of the flammable or combustible cargo.

§ 153.977 Supervision of cargo transfer.

The person in charge of cargo transfer shall:

(a) Supervise the operation of cargo system valves;

(b) Monitor the cargo loading rate to ensure it does not exceed that stated on the cargo piping plan; and

(c) Monitor the cargo level in the tanks to make sure they do not overflow.

[CGD 78-128, 47 FR 21211, May 17, 1982]

§ 153.979 Gauging with a sounding tube.

(a) No person may remove the cover of a sounding tube unless he has authorization from the person in charge of cargo transfer.

(b) The person in charge of cargo transfer may not authorize removal of the cover from a sounding tube gauge unless all tank pressure has been relieved through the tank's venting system.

§ 153.980 Isolation of automatic closing valves.

The person in charge of cargo transfer may isolate automatic closing valves described in § 153.408(b) from a cargo containment system if the following conditions are met:

(a) The containment system carries products to which § 153.408 does not apply.

(b) The valves are isolated by:

(1) Removing the valves; or

(2) Installing removable pipes and blind flanges to by-pass the valves.

[CGD 78-128, 47 FR 21211, May 17, 1982]

§ 153.981 Leaving room in tank for cargo expansion.

The person in charge of cargo transfer shall ensure that the amount of cargo in a tank does not exceed the tank's capacity at any ambient temperature between −18° C (approx. 0° F) and 46° C (approx. 115° F).

§ 153.983 Termination procedures.

Upon completion of the transfer operation, the person in charge of cargo transfer shall ensure that:

(a) The cargo transfer connections are closed off;

(b) The transfer lines and hoses are drained of cargo, either into the tank or back to the transfer terminal;

(c) Any electrical bonding between the vessel and the shore facility is broken only after the cargo hose is disconnected and all spills removed; and

(d) Each vent system is returned to its nonloading configuration.

SPECIAL CARGO PROCEDURES

§ 153.1000 Special operating requirements for cargoes reactive with water.

When Table 1 refers to this section, the master must ensure that the cargo:

(a) Is carried only in a containment system completely isolated from any systems containing water, such as slop tanks, ballast tanks, cargo tanks containing slops or ballast, their vent lines or piping; and

(b) Is separated by double walls, such as cofferdams and piping tunnels, from any system containing water, as for example those described in paragraph (a) of this section.

§ 153.1002 Special operating requirements for heat sensitive cargoes.

When Table 1 refers to this section, the master shall make sure that:

(a) The cargo temperature is maintained below the temperature that would induce polymerization, decomposition, thermal instability, evolution of gas or reaction of the cargo;

(b) Any heating coils in the cargo tank are blanked off; and

(c) The cargo is not carried in uninsulated deck tanks.

[CGD 78-128, 47 FR 21211, May 17, 1982]

§ 153.1004 Inhibited and stabilized cargoes.

(a) Before loading a cargo containment system with a cargo referenced to this section in Table 1, the person in charge of cargo transfer shall make sure that the cargo containment system is free of contaminants that could:

(1) Catalyze the polymerization or decomposition of the cargo; or

(2) Degrade the effectiveness of the inhibitor or stabilizer.

(b) The master shall make sure that the cargo is maintained at a temperature which will prevent crystallization or solidification of the cargo.

[CGD 78-128, 47 FR 21211, May 17, 1982]

§ 153.1010 Alkylene oxides.

(a) Before each loading of a cargo containment system with a cargo referenced to this section in Table 1, the person in charge of cargo transfer shall:

(1) Unless the tankship is equipped with independent cargo piping that meets paragraph (d) of this section:

(i) Obtain verification from a Coast Guard Marine Inspector or from a representative of the tankship's flag administration that separation of the alkylene oxide piping system complies with alkylene oxide handling plans approved by the Coast Guard or the tankship's flag administration; and

(ii) Make sure that each spectacle flange and blank flange connection that is required to separate alkylene oxide piping systems from other systems has a wire and seal attached by a Coast Guard Marine Inspector or a representative of the tankship's flag administration.

(2) Purge the containment system until the oxygen content of the cargo tank is less than 2% by volume.

(b) The person in charge of an alkylene oxide cargo transfer shall ensure that:

(1) No alkylene oxide vapor or liquid is released to the atmosphere during cargo transfer;

(2) No vapor return system connected to an alkylene oxide containment system is at the same time connected to another containment system;

(3) Alkylene oxide is discharged only by an intank cargo pump or inert gas displacement;

(4) Transfer hose is approved by the Commandant (G-MTH) under §153.530(o) for alkylene oxide transfer and is marked "For Alkylene Oxide Transfer Only"; and

(5) A water hose is laid out on deck with water pressure to the nozzle, and all alkylene oxide spillages are washed away immediately.

(c) While alkylene oxides are onboard the vessel, the master shall make sure that the oxygen content of the vapor space above the alkylene oxide and those spaces specified in §153.530 (k) and (l) is maintained below 2% by volume.

(d) Tankships with independent piping for alkylene oxides must have onboard:

(1) Alkylene oxide handling plans approved by the Coast Guard or the tankship's flag administration; and

(2) Certification from the Coast Guard or the tankship's flag administration that the cargo piping for alkylene oxides is independent.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21211, May 17, 1982; CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.1011 Changing containment systems and hoses to and from alkylene oxide service.

(a) The person in charge of cargo transfer shall make sure that:

(1) No alkylene oxide is loaded into a containment system that last carried a cargo other than an alkylene oxide unless the containment system has been cleaned and inspected to make sure it is in good condition with no heavy rust accumulations or traces of previous cargoes;

(2) No alkylene oxide is loaded into a containment system that within the previous three loadings carried a cargo listed in paragraph (b) of this section unless the containment system has been cleaned to the satisfaction of a Coast Guard Marine Inspector or a person specifically authorized by the Commandant (G-MTH) to approve alkylene oxide tank cleaning;

(3) No cargo but an alkylene oxide is loaded into a containment system which last carried an alkylene oxide unless the containment system has been cleaned of alkylene oxide to the satisfaction of a Coast Guard Marine Inspector or person specifically authorized by the Commandant (G-MTH) to approve alkylene oxide tank cleaning; and

(4) No hose marked "For Alkylene Oxide Transfer Only" is used for the transfer of a cargo other than an alkylene oxide.

(b) The following cargoes are particularly reactive with alkylene oxides:

(1) Non-oxidizing mineral acids (e.g. hydrochloric, phosphoric);

(2) Sulfuric acid;

(3) Nitric acid;

(4) Organic acids (e.g. acetic, formic);

(5) Halogenated organic acids (e.g. chloroacetic);

(6) Sulfonic acids (e.g. alkyl benzene sulfonic);

(7) Caustic alkalies (e.g. caustic soda, caustic potash; sodium hydrosulfide);

(8) Ammonia and ammonia solutions;

(9) Aliphatic amines;

(10) Alkanolamines; and

(11) Oxidizing substances.

[CGD 78-128, 47 FR 21211, May 17, 1982, as amended by CGD 82-063b, 48 FR 4782, Feb.

3, 1983; CGD 81-078, 50 FR 21174, May 22, 1985]

§ 153.1020 Unusually toxic cargoes.

(a) No person may load or carry a cargo referenced to this section in Table 1 unless the cargo's piping and venting systems are separated from piping and venting systems carrying cargoes not referred to this section.

(b) The master shall ensure that no heat transfer medium that has been circulated through a cargo referenced to this section in Table 1 is circulated through a cargo not referenced to this section unless he determines the medium to be uncontaminated with cargo.

(c) No person may discharge overboard condensed steam from the heating system of a cargo referenced to this section in Table 1 unless he first determines the condensate to be uncontaminated with cargo.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21212, May 17, 1982]

§ 153.1025 Motor fuel antiknock compounds.

(a) No person may load or carry any other cargo in a containment system approved for motor fuel antiknock compounds containing lead alkyls except a cargo to be used solely in the manufacture of motor fuel antiknock compounds.

(b) The master shall ensure that no person enter a pumproom or void space that contains piping from a containment system approved for motor fuel antiknock compounds containing lead alkyls unless:

(1) The pumproom or void space atmosphere has been analyzed for its lead (as Pb) content and found to be less than 0.075 mg/m^3; or

(2) The person follows the procedures for entering a cargo tank described in paragraph (c) of this section.

(c) No person may enter a cargo tank endorsed for motor fuel antiknock compounds containing lead alkyls without prior specific authorization from the Commandant (G-MTH). This authorization may be obtained by telephone ((202) 267-1217) if the person has previously obtained approval for the cargo tank entry procedure from the Commandant (G-MTH).

(d) No person may enter a cargo tank endorsed for motor fuel antiknock compounds if he does not follow the conditions in the authorization under paragraph (c) of this section.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21212, May 17, 1982; CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 88-100, 54 FR 40042, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 153.1035 Acetone cyanohydrin or lactonitrile solutions.

No person may operate a tankship carrying a cargo of acetone cyanohydrin or lactonitrile solutions, unless that cargo is stabilized with an inorganic acid.

[CGD 88-100, 54 FR 40042, Sept. 29, 1989 as amended by 55 FR 17276, Apr. 24, 1990]

§ 153.1040 Carbon disulfide.

(a) No person may load, carry, or discharge carbon disulfide unless the cargo tank has a water pad over the cargo of at least one meter (approx. 40 in.).

(b) The person in charge of a carbon disulfide transfer operation shall ensure that carbon disulfide is discharged only by displacement or intank cargo pump.

(c) No person may remove a cargo pump for a containment system that carries carbon disulfide unless:

(1) The containment system has a gas free certificate issued under the standards in § 35.01-1 of this chapter; or

(2) The vapor space in the pump well is filled with water.

§ 153.1045 Inorganic acids.

When Table 1 refers to this section, the person in charge of cargo transfer shall ensure that the legends "NO SMOKING" and "NO OPEN LIGHTS" are displayed on the warning sign required in § 153.955(a) when cargo is transferred.

§ 153.1046 Sulfuric acid.

No person may liquefy frozen or congealed sulfuric acid other than by external tank heating coils.

§ 153.1052 Carriage of other cargoes in acid tanks.

No person may load or carry other cargoes in a cargo containment system endorsed to carry sulfuric acid, hydrochloric acid, or phosphoric acid without specific authorization from the Commandant (G-MTH).

[CGD 78-128, 47 FR 21212, May 17, 1982, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.1060 Benzene.

The Master shall ensure that:

(a) No person on the vessel is exposed to an airborne concentration of benzene in excess of:

(1) 10 parts per million (10 ppm) as an eight-hour time weighted average.

(2) Twenty-five parts per million (25 ppm) as a time weighted average over any ten minute period;

(b) Personnel engaged in duties listed in 46 CFR 153.932(a)(1) through (5) don and use respirators meeting 29 CFR 1910.134, if benzene exposure limits under paragraph (a) of this section are likely to be exceeded;

(c) The words: BENZENE. CANCER HAZARD IN THIS AREA. PROTECTIVE EQUIPMENT MAY BE REQUIRED. AUTHORIZED PERSONNEL ONLY.

Are on the warning sign under § 153.955.

[CGD 75-075, 44 FR 69300, Dec. 3, 1979]

§ 153.1065 Sodium chlorate solutions.

(a) No person may load sodium chlorate solutions into a containment system that previously carried another cargo unless the containment system is thoroughly washed before loading.

(b) The person in charge of cargo transfer shall make sure that spills of sodium chlorate solutions are immediately washed away.

[CGD 81-078, 50 FR 21174, May 22, 1985]

APPROVAL OF SURVEYORS AND HANDLING OF CATEGORIES A, B, C, AND D CARGO AND NLS RESIDUE

SOURCE: CGD 81-101, 52 FR 7785, Mar. 12, 1987, unless otherwise noted.

§ 153.1100 Responsibility of the person in charge.

The person in charge of the ship shall ensure that—

(a) The requirements of §§ 153.1102 through 153.1132 are met; and

(b) The procedures in the approved Procedures and Arrangements Manual are followed.

§ 153.1101 Procedures for getting a Surveyor: Approval of Surveyors.

(a) At least 24 hours before a Surveyor is needed, the person wishing the services of a Surveyor must contact the Captain of the Port or the Marine Safety Office that has jurisdiction over the port at which the Surveyor will be needed to—

(1) Arrange for the Coast Guard to provide a Surveyor; or

(2) Inform the Coast Guard of the selection of a Surveyor from one of the organizations accepted by the Coast Guard to provide Surveyors.

(b) Organizations may be accepted by the Coast Guard to provide Surveyors if they—

(1) Are engaged, as a regular part of their business, in performing inspections or tests of bulk liquid cargo tanks or bulk liquid cargo handling equipment;

(2) Are familiar with the references in § 153.0(b) and with the requirements of this part;

(3) Are not controlled by the owners or operators of ships needing the services of the Surveyors or the facilities at which those ships would unload cargo;

(4) Are not dependent on Coast Guard acceptance under this section to remain in business; and

(5) Sign a Memorandum of Understanding with the Coast Guard.

(c) Each application for acceptance as a Surveyor must be submitted to the Commandant (G-MTH) and must contain the following:

(1) The name and address of the organization, including subsidiaries and divisions, requesting acceptance by the Coast Guard to provide Surveyors.

(2) A statement that the organization is not controlled by the owners or operators of ships needing the services of Surveyors or the facilities at which

these ships would unload, or a full disclosure of any ownership or controlling interest held by such parties.

(3) A description of the experience and qualifications of the personnel who would be performing the function of Surveyor.

(4) A statement that the persons who will be performing the function of Surveyor have been trained in and are familiar with the requirements of Annex II and the regulations in this part.

(5) A statement that the Coast Guard may verify the information submitted in the application and may examine the persons who will be performing the function of Surveyor to determine their qualifications.

(d) The acceptance of an organization may be terminated by the Commandant if the organization fails to properly perform or supervise the inspections required in this part.

§ 153.1102 Handling and disposal of NLS residue: Categories A, B, C, and D.

(a) Except those Category A NLS residues that must be discharged under paragraph (c) of this section, NLS residue from an NLS whose vapor pressure is 5 kPa (50 mbar) or less at 20 °C (68 °F) must be—

NOTE TO PARAGRAPH (a): The Marine Protection, Research, and Sanctuaries Act allows specific liquids to be discharged to the sea under permits issued by the EPA.

(1) Unloaded to any consignee;

(2) Returned to the shipper;

(3) Discharged to a reception facility;

(4) Retained on the ship; or

(5) Discharged to the sea under § 153.1126 or § 153.1128.

(b) Except those Category A NLS residues that must be discharged under paragraph (c) of this section, NLS residue from an NLS whose vapor pressure is greater than 5 kPa (50 mbar) at 20 °C must be—

(1) Handled in the same way as the NLS residue under paragraph (a) of this section; or

(2) Ventilated following a ventilation procedure in the approved Procedures and Arrangements Manual.

NOTE: The Clean Air Act (42 U.S.C. 7401 *et seq*) allows states to regulate emissions from tank ventilation. There may be other regulations, both local and Federal, that affect the use of tank ventilation for safety or environmental purposes.

(c) NLS residue containing Category A NLS in pumproom bilges and in spill trays at the manifold must be discharged to a reception facility.

[CGD 81-101, 52 FR 7785, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.1104 Draining of cargo hose: Categories A, B, C, and D.

Before a cargo hose used in discharging an NLS from a ship's cargo tank is disconnected, the hose must be drained back to the transfer terminal unless the tank unloading the cargo has a waiver under § 153.483 or § 153.491.

[CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.1106 Cleaning agents.

No tank cleaning agent other than water or steam may be used to clean an NLS residue from a cargo tank except as prescribed in the approved Procedures and Arrangements Manual.

§ 153.1108 Heated prewash for solidifying NLS, high viscosity NLS and required prewashes of NLS whose viscosity exceeds 25 mPa sec at 20 °C: Categories A, B, and C.

(a) When a high viscosity or solidifying cargo is unloaded from a cargo tank, the cargo tank must be prewashed unless § 153.1114 or paragraph (c) of this section allows the prewash to be omitted.

(b) When a prewash is required for a tank that has unloaded a solidifying cargo or a cargo having a viscosity exceeding 25 mPa sec at 20 °C, the wash water used in the prewash must leave the tank washing machine at a temperature of at least 60 °C (140 °F).

(c) The prewash required under paragraph (a) of this section may be omitted if the approved Procedures and Arrangements Manual contains a procedure for measuring the temperature of all interior cargo tank surfaces throughout unloading and under the measuring procedure the temperature of these surfaces remains above—

(1) The temperature of the cargo's melting point if the cargo is a Category B or C solidifying NLS; or

(2) The temperature at which the cargo's viscosity exceeds—

(i) 25 mPa.s, if the cargo is a high viscosity Category B NLS; or

(ii) 60 mPa.s, if the cargo is a high viscosity Category C NLS.

81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.1112 Prewash for tanks containing Category A NLS residue.

Unless § 153.1114 allows the prewash to be omitted, a cargo tank that unloads a Category A NLS cargo must be prewashed following the procedures in § 153.1120.

§ 153.1114 Conditions under which a prewash may be omitted: Categories A, B, and C.

A prewash required by this part may be omitted if one of the following requirements is met:

(a) A Surveyor has signed a statement in the Cargo Record Book that the next cargo has been determined to be one that may be loaded without washing the tank, and the tank is not washed or ballasted before it is loaded with the next cargo.

(b) A Surveyor has signed a statement in the Cargo Record Book that the approved Procedures and Arrangements Manual contains procedures for removing the NLS residue by ventilation, and the cargo tank is not washed or ballasted before being cleaned following the ventilation procedure.

NOTE: The Clean Air Act (42 U.S.C. 7401 *et seq.*) allows states to regulate emissions from tank ventilation. There may be other regulations, both local and Federal, that affect the use of tank ventilation for safety or environmental purposes.

(c) The tank requiring the prewash has a waiver issued under § 153.483 or § 153.491 and the waiver states when the tank is to be prewashed.

§ 153.1116 Prewash for tanks unloaded without following the approved Procedures and Arrangements Manual: Categories B and C.

If for any reason more Category B or C NLS residue remains in a cargo tank and transfer piping of a ship after unloading than would remain after a normal discharge of the cargo when the unloading procedures in the approved Procedures and Arrangements Manual are followed, the tank must be prewashed following the procedures in § 153.1120 unless—

(a) Section 153.1114 allows the prewash to be omitted; or

(b) The residue is reduced using another procedure, and a Surveyor estimates and states in the Cargo Record Book that the cargo tank and transfer piping contain no more NLS residue than they would if discharged following the procedures in the approved Procedures and Arrangements Manual, and no other prewash is required by this part.

§ 153.1118 Prewash of Categories B and C cargo tanks not meeting stripping standards: Categories B and C.

(a) Unless § 153.1114 allows the prewash to be omitted, a cargo tank from which a Category B NLS is unloaded must be prewashed using the procedures in § 153.1120(b) if the tank—

(1) Operates under the interim standard in § 153.481(b); or

(2) Has a waiver issued under § 153.483.

(b) Unless § 153.1114 allows the prewash to be omitted, a cargo tank from which a Category C NLS is unloaded must be prewashed using the procedures in § 153.1120(b) if the tank has a waiver issued under § 153.483.

§ 153.1119 When to prewash and discharge NLS residues from a prewash: unloading an NLS cargo in a country whose Administration is not signatory to MARPOL 73/78: Categories A, B, and C.

(a) Except as allowed in paragraphs (b), (c), and (e) of this section, each prewash required by this subpart must be completed and all tank washings must be discharged to a reception fa-

best copy available

cility before the ship leaves the unloading port.

(b) NLS residue from the prewash following the unloading of a Category B NLS may be transferred to a slop tank for discharge under § 153.1126 instead of being discharged under paragraph (a) of this section if the prewash is required solely under § 153.1118(a)(1).

(c) A tank that is required by this part to be prewashed may be prewashed in a port other than the unloading port if the following conditions are met:

(1) The person in charge requests permission from the Commandant (G-MTH) (tel # 202-267-1217) if the prewash port is a foreign port, or the Captain of the Port having jurisdiction over the unloading port if the prewash port is a U.S. port.

(2) The person in charge supplies with the request required under paragraph (c)(1) of this section—

(i) The name of the ship;

(ii) The name of the owner;

(iii) The name of the NLS;

(iv) The approximate date the tank will be prewashed if the relocation of the prewash port is for one time only;

(v) A written agreement to receive the tank washings by a reception facility in the prewash port;

(vi) When the prewash port or terminal is in a country whose Administration is signatory to MARPOL 73/78, a written attestation from the person in charge of each prewash port or terminal that the Administration has determined the port or terminal to have adequate reception facilities for the NLS residue;

(vii) Written pledges from the person in charge that—

(A) The tank to be prewashed will not be washed or ballasted before being prewashed; and

(B) The ship will be taken to the reception facility and the tank prewashed in accordance with the requirements in § 153.1120; and

(viii) Any additional information the Captain of the Port or Commandant (G-MTH) requests to evaluate granting the permission.

(3) The Coast Guard or Commandant (G-MTH) has granted the permission in writing, the permission is carried aboard the ship, and the person in charge of the ship has made an entry in the Cargo Record Book stating that the permission has been granted.

(d) Unless the permission granted under paragraph (c)(4) of this section includes alternate conditions of termination or revocation in writing, the permission is—

(1) Terminated after the tank is prewashed as pledged in paragraph (c)(3)(vii) of this section or loaded with another cargo;

(2) Revoked if either of the pledges in paragraph (c)(3)(vii) of this section is invalidated or the agreement in paragraph (c)(3)(v) of this section is repudiated; and

(3) Revoked at any time the ship is not operated in accordance with the pledges in paragraph (c)(3)(vii) of this section and the conditions listed with the granted permission.

(e) A U.S. ship that would otherwise be required by this part to prewash in a port without reception facilities must obtain permission from Commandant (G-MTH) to prewash in an alternate port.

§ 153.1120 Procedures for tank prewash Categories A, B, and C.

Except where the approved Procedures and Arrangements Manual prescribes a different procedure, each of the following steps must be done in the order listed for the Coast Guard to consider the tanks prewashed under this part:

(a) When this part requires a prewash of a tank containing Category A NLS residue and the alternative prewash procedure in paragraph (b) of this section is not used, the prewash must meet the following:

(1) The prewash may not begin until—

(i) A Surveyor is present; and

(ii) Instrumentation or equipment is available that is capable of measuring the concentration of the Category A NLS in the NLS residue and determining whether it is below 0.1 per cent by weight.

(2) The equipment specified in § 153.484 must be used as prescribed in

the approved Procedures and Arrangements Manual for the prewash.

(3) The wash water must be heated if required by § 153.1108, and water or tank washings must pass through the cargo pump and piping, including any stripping equipment, during washing or during discharge of tank washings.

(4) The tank washing machine must be placed in all positions specified for the tank's Category A NLS prewash procedure in the approved Procedures and Arrangements Manual.

(5) The tank must be pumped out each time there are enough tank washings collected in the bottom of the tank for the pump to gain suction, and if the NLS is immiscible with water or is a solidifying cargo, all floating and suspended NLS must be discharged.

(6) The washing machine must be operated until samples of the discharged tank washings taken by the Surveyor are tested using the equipment required by paragraph (a)(1)(ii) of this section and the concentration of NLS is below 0.1 per cent by weight.

(7) After the washing is stopped, the remaining tank washings must be pumped out.

(8) The Cargo Record Book must have items 12 through 14 completed and must show the Surveyor's written certification of their accuracy.

(9) The Cargo Record Book must have the Surveyor's written concurrence that the prewash procedures specified in the approved Procedures and Arrangements Manual were followed.

(b) When this part requires a prewash of a tank containing Category B or C NLS residue or when the procedure in this paragraph is used as an alternative to the prewash procedure under paragraph (a) of this section, the prewash must meet the following:

(1) If the prewash is for a Category A NLS, the prewash may not begin until a Surveyor is present.

(2) The equipment specified in § 153.484 must be used as prescribed in the approved Procedures and Arrangements Manual for the prewash.

(3) The wash water must be heated if required by § 153.1108, and water or tank washings must pass through the cargo pump and piping, including any stripping equipment, during washing or during discharge of tank washings.

(4) Except as required in paragraph (b)(5) of this section, the number of washing machine cycles specified in Table 153.1120 must be completed. If a prewash is required by a section listed under Column 1 of Table 153.1120 and another section listed under Column 2, the number of cycles in Column 1 must be completed but no additional cycles are necessary.

(5) If the approved Procedures and Arrangements Manual specifies that a tank washing machine must be moved for the prewash of a tank from which a Category A NLS or a solidifying NLS has been unloaded, the number of washing machine cycles specified in Table 153.1120 must be completed at each position to which the washing machine is moved.

(6) When the NLS is immiscible with water or is a solidifying cargo, the tank must be pumped out each time enough tank washings collect in the bottom of the tank for the pump to gain suction, or the procedures in paragraphs (b)(3), (b)(4), and (b)(5) of this section must be repeated two additional times with the tank pumped out each time, for a total of three washings.

(7) Items 12 through 14 in the Cargo Record Book must be completed and, if the prewash is for a Category A NLS, verification that the procedures specified in the approved Procedures and Arrangements Manual were followed shown by the Surveyor's endorsement in the Cargo Record Book.

TABLE 153.1120—NUMBER OF WASHING MACHINE CYCLES IN THE PREWASH PROCEDURE

	Number of washing machine cycles	
	Column 1: Prewash under § 153.1116 or for a solidifying NLS under § 153.1108	Column 2: Prewashes except those listed under column 1
Category A NLS	2	1
Category B or C NLS	1	1/2

[CGD 81-101, 52 FR 7785, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28975, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.1122 Discharges of NLS residue from tank washing other than a prewash: Categories A, B, and C.

Tank washings that do not result from a prewash and that contain Category A, B, or C NLS residues must be discharged to a reception facility or discharged to the sea under § 153.1126 or § 153.1128 except those tank washings resulting from washing a tank that has been cleaned following a ventilation procedure in the approved Procedures and Arrangements Manual.

§ 153.1124 Discharges of Category D NLS residue.

NLS residue from Category D NLSs must be discharged to a reception facility or discharged to the sea using the following procedure:

(a) Before discharge begins, drain or flush the NLS residue in the tank's piping systems into the tank.

(b) After draining or flushing, discharge the NLS residue to the sea in accordance with § 153.1128 or transfer it to a slop tank and discharge in accordance with § 153.1126.

§ 153.1126 Discharge of NLS residue from a slop tank to the sea: Categories A, B, C, and D.

NLS residue in a slop tank may not be discharged into the sea unless—

(a) The ship meets the conditions for discharging the NLS residue from a cargo tank in § 153.1128; and

(b) For Category B NLS residue transferred to the slop tank under § 153.1119(b), the NLS is discharged—

(1) Through an NLS residue discharge system with the flow recording equipment required in § 153.481(b)(2) operating; and

(2) At a rate maintained at or below Q in the following:

For tank contents that are miscible

$$Q = \frac{VKU^{1.4}L^{1.6}}{N} \times 10^{-5}\,\mathrm{m^3/hr}$$

For tank contents that are immiscible

$Q = KU^{1.4}L^{1.6} \times 10^{-5}\,\mathrm{m^3/hr}$

where:

Q = maximum permissible slops discharge rate in cubic meters per hour.

V = volume of slops in the tank in cubic meters.

K = 4.3, except K = 6.45 if Q is distributed between two NLS residue discharge outlets on opposite sides of the ship (see §§ 153.470(c) and 153.481(b)).

U = ship's speed in knots.

L = ship's length in meters.

N = number of tanks containing Category B NLS residue pumped into the slop tank.

§ 153.1128 Discharge of NLS residue from a cargo tank to the sea: Categories A, B, C, and D.

The discharge of NLS residue to the sea must be made witn the ship at least 22.24 km (12 nautical miles) from the nearest land, and must meet the following additional conditions:

(a) To discharge the following the ship must be in water at least 25 m (76.2 ft) deep:

(1) Category B or C NLS residue diluted to less than 1 ppm of the NLS.

(2) Category B or C NLS residue resulting from washing a tank after the following washing procedure has been completed:

(i) If the tank is not required to be prewashed under this part, the tank must be washed following the procedures that apply to a prewash of a Category B NLS in § 153.1120 using one washing machine cycle, and the tank washings discharged to a reception facility or to the sea under § 153.1126 or paragraph (a)(1), (c) or (d) of this section.

(ii) After the tank has been prewashed or has been washed under paragraph (a)(2)(i) of this section, the tank must then be washed with one cycle of the tank washing machine, and the tank washings discharged to a reception facility or to the sea in accordance with § 153.1126 or paragraph (a)(1), (c), or (d) of this section.

(b) To discharge a Category D NLS residue to which 10 times its volume in water is added and mixed, the ship must be—

(1) If self-propelled, maintained at a speed of at least 12.97 km/hr (7 knots); and

(2) If not self-propelled, maintained at a speed of at least 7.41 km/hr (4 knots).

(c) Each ship built before July 1, 1986 that discharges Category A, B or C NLS residues before January 1, 1988 must be—

(1) In water at least 25 m (76.2 ft) deep;

(2) If discharging the residue of a Category A NLS cargo, discharging only residue created by washing the Category A NLS's cargo tank after a prewash;

(3) If discharging the residue of a Category B NLS cargo, discharging no more than the larger of 1 m^3 or 1/3000th the volume of the Category B cargo loaded;

(4) If discharging the residue of a Category C NLS cargo, discharging no more than the larger of 3 m^3 of or 1/1000th the volume of the Category C cargo loaded;

(5) If self-propelled, maintained at a speed of at least 12.97 km/hr (7 knots); and

(6) If not self-propelled, maintained at a speed of at least 7.41 km/hr (4 knots).

(d) To discharge Category A, B, C, or D NLS residue other than as allowed under paragraphs (a) through (c) of this section, the ship must be—

(1) In water at least 25 m (76.2 ft) deep;

(2) Discharging at a rate not exceeding that used for Q_d in § 153.470;

(3) If self-propelled, maintained at speed no less than the minimum specified in the approved Procedures and Arrangements Manual but at least 12.97 km/hr (7 knots);

(4) If not self-propelled, maintained at a speed no less than the minimum specified in the approved Procedures and Arrangements Manual but at least 7.41 km/hr (4 knots);

(5) If discharging the residue of a Category A NLS cargo, discharging only residue created by washing the Category A NLS's cargo tank after a prewash;

(6) If discharging the residue of a Category B NLS cargo, discharging no more than the larger of 1 m^3 or 1/3000th the volume of the Category B cargo loaded;

(7) If discharging the residue of a Category C NLS cargo, discharging no more than the larger of 3 m^3 of or 1/1000th the volume of the Category C cargo loaded;

(8) Discharging through an NLS residue discharge system meeting § 153.470.

[CGD 81-101, 52 FR 7785, Mar. 12, 1987, as amended by CGD 81-101, 53 FR 28976, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

§ 153.1130 Failure of slops discharge recording equipment; operating with, reporting failures, and replacing pollution equipment: Category A, B, C, D.

(a) If equipment required in §§ 153.470 through 153.488 fails, the Coast Guard Marine Inspection Office, Marine Safety Office, or Captain of the Port must be notified within 24 hours after the failure.

(b) No person shall replace a piece of equipment required by §§ 153.470 through 153.488 unless the replacement is—

(1) Identical to the original equipment; or

(2) Allowed as an alternative under § 153.10.

(c) The following conditions apply when discharge recording equipment required under § 153.481(b)(2) fails:

(1) No NLS residue may be discharged unless the approved Procedures and Arrangements Manual contains procedures for discharging with incapacitated discharge recording equipment while meeting the discharge restrictions of § 153.1126(b) and these procedures are followed.

(2) The failure of the discharge recording equipment must be recorded in the Cargo Record Book within 24 hours after the failure.

(3) If the ship operates under a Certificate of Inspection, the failed discharge recording equipment must be repaired or replaced within 60 days after it fails, and the repair or replacement recorded in the Cargo Record Book and reported to the Coast Guard within 24 hours after it is completed.

§ 153.1132 Reporting spills and non-complying discharges: Category A, B, C, and D.

The following shall be reported following the procedures applying to oil in 33 CFR 151.15 (c), (d), (g), (h):

(a) All discharges of the NLS that do not meet the requirements of this part.

(b) All spills into the water.

MAINTENANCE

§ 153.1500 Venting system rupture disks.

The master shall ensure that a relief valve exposed to a cargo after the failure of a rupture disk or breaking pin is cleaned and operates properly before the next cargo is loaded into the tank.

§ 153.1502 Fixed ballast relocation.

No person may remove or relocate fixed ballast unless:

(a) The change is approved by the Commandant (G-MTH); or

(b) The ballast is temporarily moved under the supervision of a Coast Guard Marine Inspector for examination or repair of the tankship.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 153.1504 Inspection of personnel emergency and safety equipment.

The master shall ensure that the personnel emergency and safety equipment required by § 153.214 is inspected each 30 days and found to be in good condition and operating properly.

Subpart D—Test and Calculation Procedures for Determining Stripping Quantity, Clingage NLS Residue, and Total NLS Residue

SOURCE: CGD 81-101, 52 FR 7788, Mar. 12, 1987, unless otherwise noted.

§ 153.1600 Equipment required for conducting the stripping quantity test.

The operator shall ensure the stripping quantity test is conducted with—

(a) Equipment that maintains a backpressure of at least 100 kPa (1 atm) (gauge) at the connection of the discharge line of the tank to be tested to the cargo transfer hose, including, but not limited to, piping whose discharge is 10 m above the manifold or a constant pressure valve in the discharge line and set at 100 kPa;

(b) A container for measuring the volume of water remaining in the tank to an accuracy of ± 5%;

(c) A squeegee or broom to collect standing water on the tank floor;

(d) One or more containers for collecting and transferring water; and

(e) One of the following for transferring the water remaining in the tank to the measuring container:

(1) A wet vacuum.

(2) A positive displacement pump.

(3) An eductor with an air/water separator in line.

§ 153.1602 Test procedure for determining the strippinq quantity.

(a) The stripping quantity of a tank must be determined by testing the tank under the procedures in paragraph (b) of this section unless the Coast Guard agrees under the provisions of § 153.10 to accept the stripping quantity, previously determined under paragraph (b) of this section, of a tank having similar geometry, internal structure, and piping system.

(b) When testing a tank for stripping quantity, the owner or operator of the ship shall proceed as follows:

(1) Make arrangements with the Officer in Charge, Marine Inspection, for a Coast Guard Marine Inspector to witness the stripping test.

(2) Clean and gas free the tanks to be tested.

(3) Determine the least favorable values of list and trim for drainage within the range allowed by the approved Procedures and Arrangements Manual.

(4) Maintain the ship's list and trim during the test to that determined under paragraph (b)(3) of this section.

(5) Load the tank with enough water so that unloading the water simulates the final stages of unloading a full tank of cargo.

(6) Pump out the water and strip the tank using the procedures specified in the approved Procedures and Arrangements Manual.

(7) After shutting the manifold valve, open any cargo pump foot valve

to allow water trapped in the cargo pump to drain into the tank.

(8) Open all valves in the piping system except the manifold valve and allow the water to drain into the tank.

(9) Squeegee or sweep the water drained under paragraphs (b)(7) and (b)(8) of this section and any water that stands in puddles on the tank floor to the tank's low point or sump and collect in the container required by § 153.1600(b) using the equipment required in § 153.1600(e).

(10) With the manifold valve still closed, drain any water remaining in the piping system on the ship's side of the cargo transfer manifold valve into containers, and add this water to that collected from the tank under paragraph (b)(9) of this section. Water collected from a cargo line serving a block of tanks may be prorated between all the tanks it serves if—

(i) The ship owner requests, under the provisions of § 153.10, that the water be prorated; and

(ii) The ship's approved Procedures and Arrangements Manual specifies that no tank in the block be washed until all the tanks in the block have been discharged.

(c) Include any water that is trapped in dead end pipe sections, either by—

(1) Draining the pipe sections and adding the water to that collected in the container under paragraphs (b)(9) and (b)(10) of this section; or

(2) Adding an estimate of the water's volume to the sum calculated in paragraph (d) of this section using the pipe's dimensions, the ship's list and trim, and the geometry of the piping system.

(d) Measure the volume of water collected in the container under paragraphs (b)(9), (b)(10), and (c)(1) of this section and add to that volume the volume, if any, estimated under paragraph (c)(2) of this section.

§ 153.1604 Determining the stripping quantity from the test results.

(a) For a single test, the stripping quantity is the volume of water calculated under § 153.1602(d).

(b) If multiple tests are made on a tank without modifications to the tank, pumping system, or stripping procedure between the tests, the stripping quantity must be taken as the average of the stripping quantities for all of the tests.

(c) If multiple tests are made on a tank with modifications to the tank, pumping system, or stripping procedure between the tests, the stripping quantity is the stripping quantity determined under paragraph (b) of this section using only those tests performed after the last modification.

§ 153.1608 Calculation of total NLS residue and clingage NLS residue.

(a) The total NLS residue for each tank is calculated by adding the stripping quantity and the clingage NLS residue.

(b) The clingage NLS residue for each tank is calculated using the following formula:

$$Q_{clingage} = 1.1 \times 10^{-4} A_d + 1.5 \times 10^{-5} A_w + 4.5 \times 10^{-4} L^{1/2} A_b$$

where:

A_b = Area of the tank bottom added to the area in square meters of tank structural components projected on a horizontal surface

A_d = Area of the tank underdecks added to the area in square meters of tank structural components projected on a horizontal surface

A_w = Area of the tank walls added to the area in square meters of tank structural components projected on a vertical surface

L = Length of tank in meters from fore to aft

$Q_{clingage}$ = volume of clingage in cubic meters

When using the formula in this paragraph, areas that are inclined more than 30° from the horizontal may be assumed to be vertical.

NOTE: The Commandant (G-MTH) (tel #202-267-1217) has information that may be useful in approximating surface areas of typical structural members for the projected area calculations under § 153.1608(b).

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS

Cargo name [1]	IMO Annex II pollution category [2]	Haz. [3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
Acetic acid	D	S	III	4m	PV	Restr	A	.238(a), .527, .554	I-D
Acetic anhydride	D	S	II	4m	PV	Restr	A	.238(a), .526, .527, .554	I-D
Acetone cyanohydrin	A	S/P	II	B/3	PV	Closed	A	.238(a), .316, .336, .408, .525, .526, .527, .912(a)(2), .933, .1002, .1004, .1020, .1035.	I-D
Acetonitrile	III	S	II	B/3	PV	Restr	A	.525, .526, .1020	I-D
Acrylamide solution (50% or less)	D	S	II	NR	Open	Closed	NSR	.409, .525(a), (c), (d), (e), .912(a)(1), .1002(a), .1004, .1020.	NA
Acrylic acid	D	S	III	4m	PV	Restr	A	.238(a), .526, .912(a)(1), .1002(a), .1004	I-D
Acrylonitrile	B	S/P	II	B/3	PV	Closed	A	.236(a), (c), (d), .316, .408, .525, .526, .527, .912(a)(1), .1004, .1020.	I-D
Adiponitrile	D	S	III	4m	PV	Restr	A	.526	I-D
Alcohol(C6-C17)(secondary) poly(3-6)ethoxylates.	A	P	II	NR	Open	Open	A	**.409**	NA
Alcohol(C6-C17)(secondary) poly(7-12)-ethoxylates.	B	P	III	NR	Open	Open	A	.409, .440, .908(a), (b)	NA
Alcohol(C12-C15) poly(1-3)ethoxylates	A	P	II	NR	Open	Open	A	.409	NA
Alcohol(C12-C15) poly(3-11)ethoxylates	A	P	II	NR	Open	Open	A	**.409**	NA
Alkyl acrylate-Vinyl pyridine copolymer in Toluene.	C	P	III	4m	PV	Restr	A	.409	NA
Alkylbenzenesulfonic acid (*greater than 4%*).	C	S/P	III	NR	Open	Open	A, B	.440, .908(a)	NA
Alkylbenzenesulfonic acid, sodium salt solution.	C	P	III	NR	Open	Open	NSR	.440, .903, .908(a), (b)	NA
Allyl alcohol	B	S/P	II	B/3	PV	Closed	A	.316, .408, .525, .526, .527, .933, .1020	I-C
Allyl chloride	B	S/P	II	B/3	PV	Closed	A	.316, .408, .525, .526, .527, .1020	I-D
Aluminum chloride (30% or less), Hydrochloric acid (20% or less) solution.	D	S	III	4m	PV	Restr	NSR	.252, .526, .527, .554, .557, .933, .1045, .1052	I-B
2-(2-Aminoethoxy) ethanol	D	S	III	NR	Open	Open	**A, C, D**	.236(b), (c), .409	NA
Aminoethylethanolamine	D	S	III	NR	Open	Open	A	.236(a), (b), (c), (g)	NA
N-Aminoethylpiperazine	D	S	III	4m	PV	Restr	**A**	.236(b), (c), .409, .526	I-C
2-Amino-2-methyl-1-propanol (90% or less).	D	S	III	NR	Open	Open	A	**.236(a), (b), (c), (g)**	I-D[18]
Ammonia aqueous (28% or less), *see* Ammonium hydroxide (28% or less NH_3).									
Ammonium hydroxide (28% or less NH_3)	C	S/P	III	4m	PV	Restr	**A, B, C**	.236(b), (c), (f), .526, .527	I-D
Ammonium nitrate solution (greater than 45% and less than 93%).	D	S	II	NR	Open	Open	NSR	**.238(d), .252**, .336, .409, .554(a), (b)	NA
Ammonium sulfide solution (45% or less)	B	S/P	II	B/3	PV	Closed	**A, C**	.236(a), (b), (c), (g), **.316**, .372, .408, .525, .526, **.527**, .933, .1002, .1020.	I-D

Ammonium thiocyanate (25% or less), Ammonium thiosulfate (20% or less) solution.	C	P	III	NR	Open	Open	NSR	None	NA
Ammoniem thiosulfate solution (60% or less).	C	P	III	NR	Open	Open	NSR	**.440, .908(b)**	NA
(commercial, iso-, n-, sec-) Amyl acetate	C	P	III	4m	PV	Restr	A	.409	I-D
Aniline	C	S/P	II	B/3	PV	Closed	A	.316, .408, .525, .526, .933, .1020	I-D
Anthracene oil (Coal tar fraction) *see* Coal tar.									
Aviation alkylates (*C8 paraffins and iso-paraffins, b. pt. 95–120 deg. C*).	C	P	III	4m	PV	Restr	B	**.409**	I-C
Benzene hydrocarbon mixtures (*having 10% Benzene or more*).	C	S/P	III	B/3	PV	Restr	**A, B**	.316, .440, .526, .908(b), .1060	I-D
Benzenesulfonyl chloride	D	S	III	4m	PV	Restr	**A, B, D**	.236(a), (b), (c), (g), .409, .526	I-D
Benzene, Toluene, Xylene mixtures (*having 10% Benzane or more*).	@C	S/P	III	B/3	PV	Restr	B	.316, .440, .526, .908(b), .1060	I-D
Benzyl acetate	C	P	III	NR	Open	Open	A	None	I-D[16]
Benzyl alcohol	C	P	III	NR	Open	Open	A	None	I-D
Benzyl chloride	B	S/P	II	B/3	PV	Closed	**A, B**	.316, .408, .525, .526, .527, .912(a)(2), .1004, .1020.	I-D
Butene oligomer	B	P	III	NR	Open	Open	A	None	NA
(iso-, n-) Butyl acetate	C	P	III	4m	PV	Restr	A	.409	I-D
(iso-, n-) Butyl acrylate	D	S/P	II	4m	PV	Restr	A	.526, .912(a)(1), .1002(a), (b), .1004	I-D
Butylamine (all isomers)	C	S/P	II	B/3	PV	Restr	A	.236(b), (c), .316, .408, .525, .526, .527, .1020	I-D
Butylbenzene (all isomers)	A	P	II	4m	PV	Restr	A	.409	I-D[16]
Butyl benzyl phthalate	A	P	II	NR	Open	Open	A	**.409**	I-D
n-Butyl butyrate	C	P	III	4m	PV	Restr	A	.409	I-D[16]
1,2-Butylene oxide	C	S/P	III	4m	PV	Restr	A, C	.372, .408, .440, .500, .526, .530(a), (c), (e)–(g), (m)–(o), .1010, .1011.	I-B[15]
n-Butyl ether	C	S/P	III	B/3	PV	Restr	**A, D**	.500, .525, .526, .1020	I-C
Butyl heptyl ketone	[C]	P	III	NR	Open	Open	A	None	NA
iso-Butyl isobutyrate	[B]	P	III	4m	PV	Restr	A	.409	I-D[16]
Butyl methacrylate	D	S	III	4m	PV	Restr	A, D	.526, .912(a)(1), .1002(a), (b), .1004	I-D
Butyl methacrylate, Decyl methacrylate, Cetyl-Eicosyl methacrylate mixture.	D	S	III	4m	PV	Restr	**A, C, D**	.912(a)(1), .1002(a), (b), .1004	I-D
Butyl toluene	@A	P	II	NR	Open	Open	A	.409	I-D
(n-, crude) Butyraldehyde	B	S/P	III	4m	PV	Open	A	.526	I-C
iso-Butyraldehyde	C	S/P	III	4m	PV	Open	A	.526	I-C
Butyric acid	**D**	S	III	4m	PV	Restr	A	.238(a), .554	I-D
Calcium alkyl salicylate	C	P	III	NR	Open	Open	A	.440, .903, .908(a)	NA
Calcium bromide, Zinc bromide solution *see* Drilling brine (containing Zinc salts).									
Calcium hypochlorite solution (15% or less).	C	S/P	III	4m	PV	Restr	NSR	**.238(d)**	NA
Calcium hypochlorite solution (more than 15%).	B	S/P	III	4m	PV	Restr	NSR	**.238(d)**	NA
Calcium naphthenate in Mineral oil	A	P	III	NR	PV	Open	A	**None**	NA
Camphor oil	B	S/P	II	4m	PV	Open	**A, B**	.409	I-D

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name [1]	IMO Annex II pollution category [2]	Haz. [3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
Carbolic oil	A	S/P	II	B/3	PV	Closed	A	.408, .440, .525, .526, .908(b), .933, .1020	NA
Carbon disulfide	B	S/P	II	B/3	PV	Closed	C	.236(c), .252, .408, .500, .515, .520, .525, .526, .527, .1020, .1040.	I–A
Carbon tetrachloride	B	S/P	III	B/3	PV	Closed	NSR	.316, .409, .525, .526, .527, .1020	NA
Cashew nut shell oil (untreated)	D	S	III	4m	PV	Restr	**A, B**	.526, .933	NA
Caustic potash solution	C	S/P	III	NR	Open	Open	NSR	.236(a), (c), (g), .440, .908(b), .933	NA
Caustic soda solution	D	S	III	NR	Open	Open	NSR	.236(a), (c), (g), .933	NA
Cetyl-Eicosyl methacrylate mixture	III	S	III	NR	Open	Open	**A, C, D**	.912(a)(1), .1002(a), (b), .1004	NA
Chlorinated paraffins (C10–C13)	A	P	I	NR	Open	Open	A	.408	NA
Chloroacetic acid (80% or less)	C	S/P	II	B/3	PV	Closed	NSR	**.238(e)**, .408, .440, .554, .908(b)	I–D
Chlorobenzene	B	S/P	II	4m	PV	Restr	A, B	.409, .526	I–D
Chloroform	B	S/P	III	B/3	PV	Restr	NSR	.525, .526, .527, .1020	NA
(*crude*) Chlorohydrins	D	S	II	B/3	PV	Closed	A	.408, .525, .526, .1020	I–D
4-Chloro-2-methylphenoxyacetic acid, dimethylamine salt solution.	[C]	P	III	NR	Open	Open	NSR	**.236(a), (b), (c), (g)**	NA
o-Chloronitrobenzene *see* o-Nitrochlorobenzene									
2- or 3-Chloropropionic acid	C	S/P	III	NR	Open	Open	A	.238(a), .440, .554, .908(b)	NA
Chlorosulfonic acid	C	S/P	I	B/3	PV	Closed	NSR	.408, .525, .526, .527, .554, .555, .602, .933, .1000, .1020, .1045.	I–B[13]
o-Chlorotoluene	A	S/P	III	4m	PV	Restr	A, B, C	.526	I–D
m-Chlorotoluene	B	S/P	III	4m	PV	Restr	A, B, C	.526	I–D
p-Chlorotoluene	B	S/P	II	4m	PV	Restr	**A, B, C**	.409, .440, .526, .908(b)	I–D
Chlorotoluenes (mixed isomers)	A	S/P	II	4m	PV	Restr	**A, B, C**	**.409, .526**	I–D
Coal tar	A	S/P	II	4m	PV	Restr	B, D	.409	I–D[16]
Coal tar naphtha solvent	B	S/P	III	4m	PV	Restr	A, D	.526	I–D
Coal tar pitch (molten)	D	S	III	4m	PV	Restr	B, D	**.252, .409**	I–D[16]
Coconut oil, fatty acid	C	P	III	NR	Open	Open	A	.440, .903, .908(a), (b)	NA
Cottonseed oil, fatty acid	[C]	P	III	NR	Open	Open	A	.440, .903, .908(a)	NA
Creosote (wood)	A	S/P	II	NR	Open	Open	**A, B, D**	.409	NA
Creosote (coal tar)	C	S/P	III	NR	Open	Open	A, B, D	.409	I–D
Cresols (all isomers)	A	S/P	II	NR	Open	Open	A, B	.409, .440, .908(b)	I–D
Cresols with less than 5% Phenol see Cresols (all isomers)									
Cresols with 5% or more Phenol see Phenol									
Cresylate spent caustic (*mixtures of Cresols and Caustic soda solutions*).	A	S/P	II	NR	Open	Open	NSR	.236(a), (c), .933	NA
Cresylic acid, sodium salt solution *see* Cresylate spent caustic.									
Crotonaldehyde	B	S/P	II	B/3	PV	Restr	A	.316, .525, .526, .527, .1020	I–C

Cumene	B	P	III	4m	PV	Restr	A	.409	I-D
1,5,9-Cyclododecatriene	[B]	S/P	III	4m	PV	Restr	A	.236(b), (c), .409, .526, .912(a)(1), .1002(a), (b), .1004.	I-D[16]
Cycloheptane	C	P	III	4m	PV	Restr	A	**.409**	I-D[16]
Cyclohexane	C	P	III	4m	PV	Restr	A	.409, .440, .908(b)	I-D
Cyclohexanol	C	P	III	NR	Open	Open	A	.440, .908(a), (b)	I-D
Cyclohexanone	D	S	III	4m	PV	Restr	A	.236(a), (b), .526	I-D
Cyclohexanone, Cyclohexanol mixture	[C]	S/P	III	4m	PV	Restr	A	.236(a), (b), .526	I-D
Cyclohexyl acetate	B	P	III	4m	PV	Restr	A	.409	I-D[16]
Cyclohexylamine	C	S/P	III	4m	PV	Restr	**A, C, D**	.236(a), (b), (c), (g), .526	I-D
1,3-Cyclopentadiene dimer (molten)	B	P	II	4m	PV	Restr	A	.409, .440, .488, .908(a), (b)	I-C[16]
Cyclopentane	C	P	III	4m	PV	Restr	A	.409	I-D[16]
Cyclopentene	B	P	III	4m	PV	Restr	A	.409	I-D[16]
p-Cymene	C	P	III	4m	PV	Restr	A	.409	I-D
iso-Decaldehyde	@C	P	III	NR	Open	Open	A	None	I-C
n-Decaldehyde	@B	P	III	NR	Open	Open	A	None	I-C
Decanoic acid	C	P	III	NR	Open	Open	A	.440, .903, .908(a), (b)	NA
Decene	B	P	III	4m	PV	Restr	A	.409	I-D
(iso-, n-) Decyl acrylate	A	S/P	II	NR	Open	Open	A, C, D	.236(a), (b), (c), .409, .912(a)(1), .1002(a), (b), .1004.	I-D[16]
Decyl alcohol (all isomers)	B	P	III	NR	Open	Open	A	.440, .908(b)	I-D
Diammonium salt of Zinc ethylenediamine tetraacetic acid solution[14].	#	#	III	NR	Open	Open	NSR	**.238(e)**	I-B
Dibutylamine	C	S/P	III	4m	PV	Restr	**A, B, C, D**	.236(b), (c), .526	I-C
Dibutyl phthalate	A	P	II	NR	Open	Open	A	.409	I-D
Dichlorobenzenes (all isomers)[18]	B	S/P	II	4m	PV	Restr	A, B, D	.236(a), (b), .409, **.440, .488[18]**, .526, **.908(a), (b)[18]**.	I-D
1,1-Dichloroethane	B	S/P	III	4m	PV	Restr	A, B	.526, .527	I-D
2,2'-Dichloroethyl ether	B	S/P	II	4m	PV	Restr	A	.236(a), (b), .526	I-C[16]
2,2'-Dichloroisopropyl ether	C	S/P	II	B/3	PV	Restr	**A, B, C, D**	.236(a), (b), .316, .408(a), .440, .525, .526, .1020.	I-D
Dichloromethane	D	S	III	4m	PV	Restr	NSR	.526	I-D[16]
2,4-Dichlorophenol[15]	A	S/P	II	4m	PV	Restr	**A, B, C, D**	.236(a), (b), (c), (g), .409, .440, .500, .501, .526, .908(b), .933.	I-D[16]
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution.	A	S/P	III	NR	Open	Open	NSR	**.236(a), (b), (c), (g)**	NA
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution.	A	S/P	III	NR	Open	Open	NSR	None	NA
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution.	A	S/P	III	NR	Open	Open	NSR	None	NA
1,1-, 1,2-, or 1,3-Dichloropropane	B	S/P	II	B/3	PV	Restr	A, B	.525, .526, .1020	I-D
1,3-Dichloropropene	B	S/P	II	B/3	PV	Closed	**A, B**	.316, .336, .408, .525, .526, .527, .1020	I-D
Dichloropropene, Dichloropropane mixtures.	B	S/P	II	B/3	PV	Closed	**A, B, C, D**	.316, .336, .408, .526, .527	I-D
2,2-Dichloropropionic acid	D	S	III	4m	PV	Restr	A	**.238(e)**, .266, .500, .501, .554	NA
Diethanolamine	III	S	III	NR	Open	Open	A	.236(b), (c)	NA
Diethylamine	C	S/P	III	B/3	PV	Restr	A	.236(a), (b), (c), (g), .525, .526, .527, .1020	I-C

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name [1]	IMO Annex II pollution category [2]	Haz. [3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
Diethylaminoethanol *see* Diethylethanolamine									
2,6-Diethylaniline	[C]	S/P	III	NR	Open	Open	B, C, D	.236(b), .409, .440, .908(b)	NA
Diethylbenzene	C	P	III	4m	PV	Restr	A	.409	I-D
Diethylene gylcol methyl ether	C	P	III	NR	Open	Open	A	None	I-C
Diethylenetriamine	D	S	III	NR	Open	Open	A	.236(b), (c)	NA
Diethylethanolamine	C	S/P	III	4m	PV	Restr	**A, C**	.236(a), (b), (c), (g), .526	I-C
Diethyl ether *see* Ethyl ether									
Di-(2-ethylhexyl) phosphoric acid	C	S/P	III	NR	Open	Open	**A, B, C, D**	.236(b), (c)	I-D
Diethyl phthalate	C	P	III	NR	Open	Open	A	None	I-D
Diethyl sulfate	B	S/P	II	4m	PV	Closed	**A, D**	.236(a), (c), (d), .526	I-D[16]
Diglycidyl ether of Bisphenol A	B	P	III	NR	Open	Open	A	.440, **.908(a)**	NA
Diglycidyl ether of Bisphenol F	B	P	III	NR	Open	Open	A	.409, .440, .908(a)	NA
Di-n-hexyl adipate	B	P	III	NR	Open	Open	A	.409	NA
Diisobutylamine	C	S/P	II	4m	PV	Restr	**A, B, C, D**	.236(a), (b), (c), (g), .409, .525(a), (c), (d), (e), .526, .1020	I-C
Diisobutylcarbinol	@C	P	III	NR	Open	Open	A	None	I-D[16]
Diisobutylene	B	P	III	4m	PV	Restr	A	.409	I-D
Diisobutyl phthalate	B	P	III	NR	Open	Open	A	.440, .908(a)	I-D
Diisopropanolamine	C	S/P	III	NR	Open	Open	A	.236(b), (c), .440, .908(a), (b)	I-D[16]
Diisopropylamine	C	S/P	II	B/3	PV	Closed	A	.236(b), (c), .408, .525, .526, .527, .1020	I-C
Diisopropylbenzene (all isomers)	A	P	II	NR	Open	Open	A	.409	I-D
N,N-Dimethylacetamide	D	S	III	B/3	PV	Restr	B	.236(b), .316, .525, .526, .527, .1020	I-D[16]
N,N-Dimethylacetamide solution (40% or less).	D	S	III	B/3	PV	Restr	B	.236(b), .316, .526	I-D[16]
Dimethyl adipate	B	P	III	NR	Open	Open	A	**.409**, .440, .908(b)	NA
Dimethylamine solution (45% or less)	C	S/P	III	B/3	PV	Restr	**A, C, D**	.236(a), (b), (c), (g), .525, .526, .527, .1020	I-C
Dimethylamine solution (over 45% but not over 55%).	C	S/P	II	B/3	PV	Closed	A, C, D	.236 (a), (b), (c), (g), .316, .408, .525, .526, .527, .1020	I-C
Dimethylamine solution (over 55% but not over 65%).	C	S/P	II	B/3	PV	Closed	A, C, D	.236 (a), (b), (c), (g), .316, .372, .408, .525, .526, .527, .1020	I-C
2,6-Dimethylaniline	[C]	S/P	III	NR	Open	Open	B, C, D	.236(b) .409, .440, .908(b)	I-D[16]
N,N-Dimethylcyclohexylamine	C	S/P	II	B/3	PV	Restr	A, C	.236(a), (b), (c), (g), **.316**, .409, .525, .526, .527, .1020	NA
Dimethylethanolamine	D	S	III	4m	PV	Restr	A, D	.236(b), (c), .526	I-C
Dimethylformamide	D	S	III	4m	PV	Restr	A, D	.236(b), .526	I-D
Dimethyl glutarate	C	P	III	NR	Open	Open	A	None	NA
Dimethyl hydrogen phosphite	#	S	III	4m	PV	Restr	A, D	.526	NA
Dimethyl naphthalene sulfonic acid, sodium salt solution.	[A]	P	III	NR	Open	Open	NSR	None	NA
Dimethyloctanoic acid	C	P	III	NR	Open	Open	A	.440, .903, .908(b)	I-D[16]

Dimethyl phthalate	C	P	III	NR	Open	Open	A	None	I-D
Dimethyl succinate	C	P	III	NR	Open	Open	A	.440, .908(b)	NA
Dinitrotoluene (molten)[18]	B	S/P	II[18]	B/3	PV	Closed	A	.316, .408, .440, .525, .526, .527, .908(a), **(b)**, .1020.	I-C
1,4-Dioxane	D	S	II	B/3	PV	Closed	A	.408, .525, .526, .1020	I-C
Dipentene	C	P	III	4m	PV	Restr	A	.409	I-D
Diphenyl	A	P	I	NR	Open	Open	B	**.408**	I-D[16]
Diphenyl, Diphenyl ether mixtures	A	P	I	NR	Open	Open	B	.408	I-D[16]
Diphenyl ether	A	P	III	NR	Open	Open	A	**None**	I-D
Diphenyl ether, Biphenyl phenyl ether mixtures.	A	P	III	NR	Open	Open	A, B	None	NA
Diphenylmethane diisocyanate[13]	B	S/P	II	B/3	PV	Closed	**A, B, C[13], D**	.236(a), (b), .316, .440, .500, .501, .525, .526, .602, .908(a), .1000, .1020.	NA
Diphenylol propane-epichlorohydrin resins	B	P	III	NR	Open	Open	A, B	.440, .908(a)	NA
Di-n-propylamine	C	S/P	III	4m	PV	Restr	A	.236(b), (c), .409, .525, .526, .1020	I-C
Dodecanol	B	P	III	NR	Open	Open	A	.440, **.488**, .908(a), (b)	I-D
Dodecene (all isomers)	B	P	III	NR	Open	Open	A	None	I-D
Dodecyl alcohol *see* Dodecanol									
Dodecylamine, Tetradecylamine mixture	[C]	S/P	III	4m	PV	Restr	A, D	.236(b), (c), .440, .526, .903, .908(a), (b)	NA
Dodecyl diphenyl ether disulfonate solution.	B	S/P	III	NR	Open	Open	NSR	.440, **.488**, .908(a)	NA
Dodecyl methacrylate	III	S	III	NR	Open	Open	**A, C**	.236(b), (c), .912(a)(1), .1004	I-D
Dodecyl-Pentadecyl methacrylate mixture	III	S	III	NR	Open	Open	**A, C, D**	.912(a)(1), .1002(a), (b), .1004	NA
Dodecyl phenol	A	P	I	NR	Open	Open	A	.408	I-D
Drilling brine (containing Zinc salts)	A	P	II	NR	Open	Open	NSR	.409	NA
Epichlorohydrin	C	S/P	II	B/3	PV	Closed	A	.316, .408, .525, .526, .527, .1020	I-C
Ethanolamine	D	S	III	NR	Open	Open	A	.236(b), (c), .526	I-D[16]
2-Ethoxyethyl acetate	C	P	III	4m	PV	Restr	A	.409	I-C
Ethyl acrylate	B	S/P	II	4m	PV	Restr	A	.526, .527, .912(a)(1), .1002(a), (b), .1004	I-D
Ethylamine	C	S/P	II	B/3	PV	Closed	C, D	.236(b), (c), **.252**, .372, .525, .526, .527, .1020	I-D
Ethylamine solution (72% or less)	C	S/P	II	B/3	PV	Closed	A, C	.236(a), (b), (c), (g), .372, .408, .525(a), (c), (d), (e), .526, .527, .1020.	I-D
Ethyl amyl ketone	C	P	III	4m	PV	Restr	A	.409	I-D
Ethylbenzene	C	P	III	4m	PV	Restr	A	.409	I-D
N-Ethylbutylamine	C	S/P	III	4m	PV	Restr	A	.236(a), (b), (c), (g), .409, .525(a), (c), (d), (e), .526, .1020.	I-C
Ethyl butyrate	C	P	III	4m	PV	Restr	A	**.409**	I-D
Ethylcyclohexane	C	P	III	4m	PV	Restr	A	.409	I-D[16]
N-Ethylcyclohexylamine	D	S	III	4m	PV	Restr	**A, C**	.236(a), (b), (c), (g), .409, .526	I-C
Ethylene chlorohydrin	C	S/P	II	B/3	PV	Closed	**A, D**	.316, .408, .525, .526, .527, .933, .1020	I-D
Ethylene cyanohydrin	D	S	III	NR	Open	Open	A	None	NA
Ethylenediamine	C	S/P	II	4m	PV	Restr	A	.236(b), (c), .440, .526, .908(b)	I-D
Ethylene dibromide	B	S/P	II	B/3	PV	Closed	NSR	.408, .440, .525, .526, .527, .908(b), .1020	NA
Ethylene dichloride	B	S/P	II	4m	PV	Restr	**A, B**	.236(b), .408, .526	I-D
Ethylene glycol butyl ether acetate	C	P	III	NR	Open	Open	A	None	I-C
Ethylene glycol diacetate	C	P	III	NR	Open	Open	A	**None**	I-D[16]

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name [1]	IMO Annex II pollution category [2]	Haz. [3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
Ethylene glycol ethyl ether acetate *see* 2-Ethoxyethyl acetate									
Ethylene oxide (30% or less), Propylene oxide mixture	D	S	II	B/3	PV	Closed	A, C	**.252**, .372, .408, .440, .500, .525, .526, .530, .1010, .1011, .1020	I-B
Ethyl ether	III	S	II	4m	PV	Closed	A	.236(g), .252, .372, .408, .440, .500, .515, .526, .527	I-C
Ethyl-3-ethoxypropionate	[C]	P	III	4m	PV	Restr	A	.409	NA
2-Ethylhexanol	@C	P	III	NR	Open	Open	A	None	I-D
2-Ethylhexyl acrylate	D	S/P	III	NR	Open	Open	A	.912(a)(1), .1002(a), (b), .1004	I-D
2-Ethylhexylamine	B	S/P	II	B/3	PV	Restr	A	.236(b), (c), .525, .526, .1020	I-D[18]
Ethyl hexyl phthalate	C	P	III	NR	Open	Open	A	None	NA
Ethylidene norbornene	B	S/P	III	B/3	PV	Restr	**A, B, C, D**	.236(b), .409, .526	NA
Ethyl methacrylate	D	S	III	4m	PV	Restr	**A, B, D**	.526, .912(a)(1), .1002(a), (b), .1004	I-D
Ethylphenol	A	S/P	III	NR	Open	Open	B	**.409**	I-D[18]
2-Ethyl-3-propylacrolein	B	S/P	III	4m	PV	Restr	A	.440, .526, .908(b)	I-C
Ethyl toluene	B	P	III	4m	PV	Restr	A	.409	I-D
Ferric chloride solutions	C	S/P	III	NR	Open	Open	NSR	.409, .440, .554, .555, .908(b), .1045	I-B
Ferric nitrate, Nitric acid solution	C	S/P	II	4m	PV	Restr	NSR	.408, .526, .527, .554, .555, .559, .933, .1045	I-B
Formaldehyde (50% or more), Methanol mixtures.	#	S/P	III	4m	PV	Closed	A	.526, .527	I-B
Formaldehyde solution (37% to 50%)	C	S/P	III	4m	PV	Restr	A	.526, .527	I-B
Formic acid	D	S	III	4m	PV	Restr	A	.236(b), (c), .526, .527, .554	I-D
Fumaric adduct of rosin, water dispersion	B	P	III	NR	Open	Open	NSR	.440, .908(a)	NA
Furfural	C	S/P	III	4m	PV	Restr	A	.526	I-C
Furfuryl alcohol	C	P	III	NR	Open	Open	A	None	I-C
Glutaraldehyde solution (50% or less)	D	S	III	NR	Open	Open	NSR	None	NA
Glycidyl ester of C10 Trialkyl acetic acid *see* Glycidyl ester of Tridecyl acetic acid.									
Glycidyl ester of Tridecyl acetic acid	B	P	III	NR	Open	Open	A	None	NA
Heptane (all isomers)	C	P	III	4m	PV	Restr	A	.409	I-D
Heptanol (all isomers)	C	P	III	4m	PV	Restr	A	.409	I-D
Heptene (all isomers)	C	P	III	4m	PV	Restr	A	.409	I-D
Heptyl acetate	B	P	III	NR	Open	Open	A	None	NA
Hexamethylenediamine solution	C	S/P	III	4m	PV	Restr	A	.236(b), (c), .409, .440, .526, .908(b)	I-D
Hexamethyleneimine	C	S/P	II	4m	PV	Restr	A, C	.236(a), (b), (c), (g), .526	I-C
Hexane (all isomers)	C	P	III	4m	PV	Restr	A	.409	I-D
Hexene (all isomers)	C	P	III	4m	PV	Restr	A	.409	I-D
Hexyl acetate	B	P	III	4m	PV	Restr	A	.409	I-D
Hydrochloric acid	D	S	III	4m	PV	Restr	NSR	.252, .526, .527, .554, .557, .933, .1045, .1052	I-B[17]

Hydrogen peroxide solutions (over 8% but not over 60%)	C	S/P	III	B/3	PV	Closed	NSR	236 (a), (c), 355, 409, 440(a) (1)&(2), 500, 933, 1004(a)(2), 1500	NA
Hydrogen peroxide solutions (over 60% but not over 70%).	C	S/P	II	B/3	PV	Closed	NSR	236 (a), (c), 355, 409, 440(a) (1)&(2), 500, 933, 1004(a)(2), 1500	NA
2-Hydroxyethyl acrylate	B	S/P	II	B/3	PV	Closed	A	408, 525, 526, 912(a)(1), 933, 1002 (a), (b), 1004, 1020	NA
2-Hydroxy-4-(methylthio)butanoic acid	[C]	P	III	NR	Open	Open	A	440, 903, 908(a)	NA
Isophorone diamine	D	S	III	4m	PV	Restr	A	236(b), (c), 526	NA
Isophorone disocyanate[13]	B	S/P	III	B/3	PV	Closed	A, B, C[13], **D**	236(a), (b), 316, 500, 501 526, 802, 1000, 1020	NA
Isoprene	C	S/P	III	4m	PV	Restr	B	372, 440, 912(a)(1), 1002(a), (b), 1004	I-D
Isopropylbenzene *see* Cumene									
Lactonitrile solution (80% or less)	B	S/P	II	B/3	PV	Closed	A, C, D	**236(d)**, **252**, 316, 336, 408, **440**, 525, 526, 527, **908(a)**, **912(a)(2)**, 1002, **1004**, 1020, 1035	I-D[18]
Lauric acid	B	P	III	NR	Open	Open	A	440, 488, 908(a), (b)	NA
Maleic anhydride[11]	D	S	III	4m	PV	Restr	[11]A, C	None	I-D[18]
Mercaptobenzothiazol, sodium salt solution *see* Sodium-2-mercaptobenzothiazol solution									
Mesityl oxide	D	S	III	4m	PV	Restr	A	236(b), (c), 409, 526	I-D
Metam sodium solution	A	S/P	III	NR	Open	Open	NSR	236(a), (b), (c), (g), 409	NA
Methacrylic acid	D	S	III	4m	PV	Restr	A	236(a), 526, 912(a)(1), 1002(a), 1004	NA
Methacrylonitrile	B	S/P	II	B/3	PV	Closed	A	**236(b)**, 316, 408, 525, 526, 527, 912(a)(1), 1002(a), 1004, 1020	NA
Methyl acrylate	C	S/P	II	4m	PV	Restr	A, B	526, 527, 912(a)(1), 1002(a), (b), 1004	I-D
Methylamine solution (42% or less)	C	S/P	II	B/3	PV	Closed	A, C, D	236(a), (b), (c), (g), 316, 408, 525, 526, 527, 1020	I-D
Methylamyl acetate	C	P	III	4m	PV	Restr	A	409	I-D
Methylamyl alcohol	C	P	III	4m	PV	Restr	A	409	I-D
Methylamyl ketone	C	P	III	4m	PV	Restr	A	409	I-D
Methyl butyrate	C	P	III	4m	PV	Restr	A	409	I-D
Methylcyclohexane	C	P	III	4m	PV	Restr	A	409	I-D[18]
Methylcyclopentadiene dimer	B	P	III	4m	PV	Restr	B	409	I-D[18]
Methyl diethanolamine	[C]	S/P	III	NR	Open	Open	A	236(b), (c), 440, 903, 908(a)	I-B[18]
Methylene chloride see Dichloromethane									I-C[18]
2-Methyl-6-ethylaniline	C	S/P	III	NR	Open	Open	**A, B, C, D**	None	NA
2-Methyl-5-ethylpyridine	B	S/P	III	NR	Open	Open	**A, D**	236(b)	I-D
Methyl formate	D	S	II	B/3	PV	Restr	A	372, 408, 440, 525, 526, 527, 1020	I-D
Methyl heptyl ketone	B	P	III	4m	PV	Restr	A	409	I-D[18]
2-Methyl-2-hydroxy-3-butyne	III	S	III	4m	PV	Restr	**A, B, C, D**	236(b), (d), (f), (g), 409, 526	I-D
Methyl methacrylate	D	S	II	4m	PV	Restr	**A, B**	526, 912(a)(1), 1002(a), (b), 1004	I-D
2-Methyl-1-pentene	C	P	III	4m	PV	Restr	A	409	I-D
4-Methyl-1-pentene	[C]	P	III	4m	PV	Restr	A	409	I-D[18]
2-Methylpyridine	B	S/P	II	B/3	PV	Closed	**A, C**	236(b), 408, 525(a), (c), (d), (e), 1020	I-D
3-Methylpyridine	[B]	S/P	II	B/3	PV	Closed	**A, C**	236(b), 408, 525(a), (c), (d), (e), 1020	I-D[18]
4-Methylpyridine	B	S/P	II	B/3	PV	Closed	**A, C, D**	236(b), 408, 440, 525(a), (c), (d), (e), 526, 908(b), 1020	I-D

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name [1]	IMO Annex II pollution category [2]	Haz.[3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
N-Methyl-2-pyrrolidone	B	P	III	NR	Open	Open	A	None	I-D
Methyl salicylate	B	P	III	NR	Open	Open	A	None	I-D
alpha-Methylstyrene	A	S/P	**III**	4m	PV	Restr	D	.409, .526, **.903**, .912(a)(1), .1002(a), (b), .1004	I-D
Metolachlor	@B	P	III	NR	Open	Open	A	None	NA
Morpholine	D	S	III	4m	PV	Restr	A	.236(b), (c)	I-C
Motor fuel anti-knock compounds (containing lead alkyls).	A	S/P	II	B/3	PV	Closed	**A, B, C**	.252, .316, .336, .408, .525, .526, .527, .933, .1020, .1025	I-D
Myrcene	[B]	P	III	4m	PV	Restr	A	.409	NA
Naphthalene (molten)	A	S/P	II	4m	PV	Restr	A, D	.409, .440, .908(b)	I-D[16]
Naphthalene sulfonic acid, sodium salt solution (40% or less)	[A]	P	III	NR	Open	Open	NSR	None	NA
Naphthenic acid	A	P	II	NR	Open	Open	A	.409	NA
Naphthenic acid, sodium salt solution	[A]	P	II	NR	Open	Open	NSR	.409	NA
Neodecanoic acid	C	P	III	NR	Open	Open	A	None	NA
Nitrating acid (*mixture of Sulfuric and Nitric acids*).	C	S/P	II	B/3	PV	Closed	NSR	.316, .408, .526, .527, .554, .555, .556, .559, **.602**, .933, .1000, .1045	I-B[12]
Nitric acid (70% or less)	C	S/P	II	4m	PV	Restr	NSR	.408, .526, .527, .554, .555, .559, .933, .1045	I-B[12]
Nitrobenzene	B	S/P	II	B/3	PV	Closed	**A, D**	.316, .336, .408, .440, .525, .526, .908(b), .933, .1020	I-D
o-Nitrochlorobenzene	B	S/P	II	B/3	PV	Closed	**A, B, C, D**	.316, .336, .408, .440, .525, .526, .908(a), (b), .1020	NA
o-Nitrophenol (molten)	B	S/P	II	B/3	PV	Closed	**A, C, D**	.440, .525, .526, .908(a), (b), .1020	NA
1- or 2-Nitropropane[11]	D	S	III	4m	PV	Restr	[11]A, C	.526	I-C
Nitropropane (60%), Nitroethane (40%) mixture[11].	D	S	III	4m	PV	Restr	[11]**A, C**	.236(b), .526	I-C
(o-, p-) Nitrotoluene	C	S/P	II	B/3	PV	Closed	A, B	.316, .408, .440, .525, .526, .908(b), .1020	I-D[16]
Nonane (all isomers)	C	P	III	4m	PV	Restr	B, C	.409	I-D
Nonene	B	P	III	4m	PV	Restr	A	.409	I-D
Nonyl alcohol (all isomers)	C	P	III	NR	Open	Open	A	None	I-D
Nonyl phenol	A	P	II	NR	Open	Open	A	**.409**	I-D
Nonyl phenol poly(4-12)ethoxylates	B	P	III	NR	Open	Open	A	.409, .440, .488[16], .908(a), (b)	I-D[16]
Noxious liquid, N.F., (1) n.o.s. ("trade name" contains "principal components") ST 1, Cat A.	A	P	I	NR	Open	Open	A	.408	NA
Noxious liquid, F., (2) n.o.s. ("trade name" contains "principal components") ST 1, Cat A.	A	P	I	4m	PV	Restr	A	.408	NA
Noxious liquid, N.F., (3) n.o.s. ("trade name" contains "principal components") ST 2, Cat A.	A	P	II	NR	Open	Open	A	.409	NA

Noxious liquid, F., (4) n.o.s. ("trade name" contains "principal components") ST 2, Cat A.	A	P	II	4m	PV	Restr	A	.409	NA
Noxious liquid, N.F., (5) n.o.s. ("trade name" contains "principal components") ST 2, Cat B.	B	P	II	NR	Open	Open	A	.409; (.440, .903, .908)[18]	NA
Noxious liquid, N.F., (6) n.o.s. ("trade name" contains "principal components") ST 2, Cat B, mp. equal to or greater than 15 deg. C.	B	P	II	NR	Open	Open	A	.409, .440, .488, .908(b); (.903, .908(a))[18]	NA
Noxious liquid, F., (7) n.o.s. ("trade name" contains "principal components") ST 2, Cat B.	B	P	II	4m	PV	Restr	A	.409; (.440, .903, .908)[18]	NA
Noxious liquid, F., (8) n.o.s. ("trade name" contains "principal components") ST 2, Cat B, mp. equal to or greater than 15 deg. C.	B	P	II	4m	PV	Restr	A	.409, .440, .488, .908(b); (.903, .908(a))[18]	NA
Noxious liquid, N.F., (9) n.o.s. ("trade name" contains "principal components") ST 3, Cat A.	A	P	III	NR	Open	Open	A	None	NA
Noxious liquid, F., (10) n.o.s. ("trade name" contains "principal components") ST 3, Cat A.	A	P	III	4m	PV	Restr	A	.409	NA
Noxious liquid, N.F., (11) n.o.s. ("trade name" contains "principal components") ST 3, Cat B	B	P	III	NR	Open	Open	A	(.440, .903, .908)[18]	NA
Noxious liquid, N.F., (12) n.o.s. ("trade name" contains "principal components") ST 3, Cat B, mp. equal to or greater than 15 deg. C.	B	P	III	NR	Open	Open	A	.440, .488, .908(b); (.903, .908(a))[18]	NA
Noxious liquid, F., (13) n.o.s. ("trade name" contains "principal components") ST 3, Cat B.	B	P	III	4m	PV	Restr	A	.409; (.440, .903, .908)[18]	NA
Noxious liquid, F., (14) n.o.s. ("trade name" contains "principal components") ST 3, Cat B, mp. equal to or greater than 15 deg. C.	B	P	III	4m	PV	Restr	A	.409, .440, .488, .908(b); (.903, .908(a))[18]	NA
Noxious liquid, N.F., (15) n.o.s. ("trade name" contains "principal components") ST 3, Cat C.	C	P	III	NR	Open	Open	A	(.440, .903, .908)[18]	NA
Noxious liquid, F., (16) n.o.s. ("trade name" contains "principal components") ST 3, Cat C.	C	P	III	4m	PV	Restr	A	(.440, .903, .908)[18]	NA
Octane (all isomers)	C	P	III	4m	PV	Restr	A	.409	I-D
Octanol (all isomers)	C	P	III	NR	Open	Open	A	None	I-D
Octene (all isomers)	B	P	III	4m	PV	Restr	A	.409	I-D
Octyl aldehydes	B	P	III	4m	PV	Restr	A	.409	I-D
Octyl nitrates (all isomers)	A	S/P	II	NR	Open	Open	A, B	.409, **.440, .908(b)**	I-C[18]
								.409, .560, .1002	NA

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name [1]	IMO Annex II pollution category [2]	Haz. [3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
Olefin mixtures (C5–C7)	C	P	III	4m	PV	Restr	A	.409	I–D
Olefin mixtures (C5–C15)	B	P	III	4m	PV	Restr	A	.409	I–D
alpha-Olefins (C6–C18) mixtures	B	P	III	4m	PV	Restr	A	.409, .440, .908(a), (b)	I–D
Olefins, straight chain mixtures see Olefin mixtures (C5–C7) *or* (C5–C15).									
Oleum	C	S/P	II	B/3	PV	Closed	NSR	.316, .408, .440, .526, .527, .554, .555, .556, .602, .908(a), .933, .1000, 1045, .1052.	I–B[12]
Palm kernel oil, fatty acid	C	P	III	NR	Open	Open	B	.440, .903, .908(a), (b)	NA
Palm kernel oil, fatty acid methyl ester	[C]	P	III	NR	Open	Open	A	.440, .903, .908(a)	NA
Paraldehyde	C	S/P	III	4m	PV	Restr	A	.440, .908(b)	I–C
Pentachloroethane	B	S/P	II	B/3	PV	Restr	NSR	.316, .409, .525, .526, .1020	NA
1,3-Pentadiene	C	S/P	III	4m	PV	Restr	A, B	.526, .912(a)(1), .1002, .1004	I–D
Pentane (all isomers)	C	P	III	4m	PV	Restr	A	.409	I–D
Pentene (all isomers)	C	P	III	4m	PV	Restr	A	**.409**	I–D
Perchloroethylene	B	S/P	III	4m	PV	Restr	NSR	.526	NA
Phenol (*or solutions with 5% or more Phenol*).	B	S/P	II	B/3	PV	Closed	A	.408, .440, **.488**, .525, .526, .908(a), (b), .933, .1020.	I–D[16]
1-Phenyl-l-xylyl ethane	C	P	III	NR	Open	Open	A, B	None	NA
Phosphoric acid	D	S	III	NR	Open	Open	NSR	.554, .555, .558, .1045, .1052	I–B[12]
Phthalic anhydride (molten)	C	S/P	III	4m	PV	Restr	A, D	.440, .908(b)	I–D[16]
Pinene	B	P	III	4m	PV	Restr	A	.409	I–D
Pine oil	[B]	P	III	NR	Open	Open	A	.440, .908(a)	I–D[16]
Polyalkyl(C18–C22) acrylate in Xylene	[C]	P	III	4m	PV	Restr	A	.409, .440, .903, .908(a)	NA
Polyalkylene oxide polyol	[C]	P	III	NR	Open	Open	A	.440, .903, .908(a)	NA
Polyethylene polyamines	C	S/P	III	NR	Open	Open	A	.236(b), (c), .400, .440, .908(b)	NA
Polyferric sulfate solution	C	S/P	III	NR	Open	Open	NSR	.238(d)	NA
Polymethylene polyphenyl isocyanate[13]	D	S	II	B/3	PV	Closed	A, C[13], D	.236 (a), (b), .409, .500, .501, .525, .526, .602, .1000, 1020.	NA
Poly(20)oxyethylene sorbitan monooleate	[B]	P	III	NR	Open	Open	A	.440, .908(a)	NA
Potassium hydroxide solution *see* Caustic potash solution									
iso-Propanolamine	C	S/P	III	NR	Open	Open	A	.236 (b), (c), .440, .526, **.903, .908(b)**	I–D[16]
n-Propanolamine	C	S/P	III	NR	Open	Open	A, D	.236 (b) (c), .440, .526, .908(b)	NA
Propionaldehyde	D	S	III	4m	PV	Restr	A	.316, .526, .527	I–C
Propionic acid	D	S	III	4m	PV	Restr	A	.238(a), .527, .554	I–D
Propionic anhydride	C	S/P	III	4m	PV	Restr	A	.238(a), .526	I–D
Propionitrile	C	S/P	II	B/3	PV	Closed	A, D	**.252**, .316, .336, .408, .525, .526, .527, .1020	I–D
iso-Propylamine	C	S/P	II	B/3	PV	Closed	C, D	.236(b), (c), .372, .408, .440, .525, .526, .527, .1020.	I–D
n-Propylamine	C	S/P	II	B/3	PV	Closed	A, C, D	.236(b), (c), .408, .500, .525, .526, .527, .1020	I–D
n-Propylbenzene	C	P	III	4m	PV	Restr	A	.409	I–D[16]

iso-Propylcyclohexane	C	P	III	4m	PV	Restr	A	.409, .440, .903, .908(a)	I–D[16]
Propylene dimer	C	P	III	4m	PV	Restr	A	.409	NA
Propylene oxide	D	S	II	B/3	PV	Closed	A, C	.372, .408, .440, .500, .526, .530, .1010, .1011	I–B
Propylene tetramer	B	P	III	4m	PV	Restr	A	.409	I–D[16]
Propylene trimer	B	P	III	4m	PV	Restr	A	.409	I–D
iso-Propyl ether	D	S	III	4m	PV	Restr	A	.409, .500, .515, .912(a)(1)	I–D
Pyridine	D	S	III	4m	PV	Restr	A	.236(b)	I–D
Rosin *see* Rosin oil									
Rosin oil	B	P	III	NR	Open	Open	A	**None**	I–D
Rosin soap (disproportionated) solution	B	P	III	NR	Open	Open	A	None	NA
Sodium borohydride (15% or less), Sodium hydroxide solution.	C	S/P	III	NR	Open	Open	NSR	.236(a), (b), (c), (g), .440, .908(a), .933	NA
Sodium chlorate solution (50% or less)	III	S	III	NR	Open	Open	NSR	.409, .933, .1065	NA
Sodium dichromate solution (70% or less)	C	S/P	II	B/3	Open	Closed	NSR	.236(b), (c), .408, .525, .933, .1020	NA
Sodium dimethyl naphthalene sulfonate solution *see* Dimethyl naphthalene sulfonic acid, sodium salt solution.									
Sodium hydrogen sulfide (6% or less), Sodium carbonate (3% or less) solution.	[C]	P	III	NR	Open	Open	NSR	None	NA
Sodium hydrogen sulfite solution (35% or less).	D	S	III	NR	Open	Open	NSR	None	NA
Sodium hydrosulfide solution (45% or less).	B	S/P	III	4m	PV	Restr	NSR	.526, .440, .908(b), .933	NA
Sodium hydrosulfide, Ammonium sulfide solution.	B	S/P	II	B/3	PV	Closed	**A, C**	.236(a), (b), (c), (g), .316, .372, .408, .525, .526, .527, .933, .1002, .1020.	NA
Sodium hydroxide solution *see* Caustic soda solution									
Sodium hypochlorite solution (15% or less).	C	S/P	III	4m	PV	Restr	NSR	.236(a), (b)	NA
Sodium-2-mercaptobenzothiazol solution	B	S/P	III	NR	Open	Open	NSR	.236(a), (b), (c), (g), .440, .908(b), .933	NA
Sodium N-methyldithiocarbamate solution *see* Metam sodium solution.									
Sodium naphthalene sulfonate solution (40% or less) *see* Naphthalene sulfonic acid, sodium salt solution (40% or less).									
Sodium naphthenate solution *see* Naphthenic acid, sodium salt solution.									
Sodium nitrite solution	B	S/P	II	NR	Open	Open	NSR	.408, .525(a), (c), (d), (e), .1020	NA
Sodium thiocyanate solution (56% or less).	B	P	III	NR	Open	Open	NSR	.238(a), **.409**	NA
Styrene *monomer*	B	S/P	III	4m	PV	Open	**A**, B	.236(b), .912(a)(1), .1002(a), (b), .1004	I–D
Sulfur (molten)	III	S	III	NR	Open	Open	NSR	.252, .440, .526, .545	I–C
Sulfuric acid	C	S/P	III	NR	Open	Open	NSR	.440, .554, .555, .556, .602, .908 (a), (b), .933, .1000, .1045, .1046, .1052.	I–B[12]
Tall oil (*crude and distilled*)	B	P	III	NR	Open	Open	A	**None**	NA
Tall oil, fatty acid (*resin acids less than 20%*).	C	P	III	NR	Open	Open	A	None	NA
Tall oil soap (disproportionated) solution	B	P	III	NR	Open	Open	A	.440, .908(a), **(b)**	NA

TABLE 1—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name [1]	IMO Annex II pollution category [2]	Haz. [3]	Cargo containment system [4]	Vent height [5]	Vent [6]	Gauge [7]	Fire protection system [8]	Special requirements in 46 CFR Part 153 [9]	Electrical hazard class and group [10]
1,1,2,2-Tetrachloroethane	B	S/P	III	B/3	PV	Restr	NSR	.316, .525, .526, .1020	NA
Tetradecylbenzene	[C]	P	III	NR	Open	Open	A	.440, .908(b)	I-D[16]
Tetraethylenepentamine[14]	D	S	III	NR	Open	Open	A	.236(b), (c), (g)	I-C[16]
Tetrahydrofuran	D	S	III	4m	PV	Restr	A, D	.526, .912(a)(2), .1004	I-C
Tetrahydronaphthalene	C	P	III	NR	Open	Open	A	None	I-D
1,2,3,5-Tetramethylbenzene	C	P	III	NR	Open	Open	A	None	I-D[16]
Toluene	C	P	III	4m	PV	Restr	A	.409	I-D
Toluenediamine	C	S/P	II	B/3	PV	Closed	A, B, C, D	.236(a), (b), (c), (g), .316, .408, .440, .525, .526, .527, .908(b), .933, .1020.	NA
Toluene diisocyanate[13]	C	S/P	II	4m	PV	Closed	A, C[13], D	.236(b), .316, .408, .440, .500, .501, .525, .526, .527, .602, .908(b), .1000, .1020.	I-D[16]
o-Toluidine	C	S/P	II	B/3	PV	Closed	A, C	.316, .408, .525, .526, .933, .1020	I-D[16]
Tributyl phosphate	B	P	III	NR	Open	Open	A	None	I-D
1,2,4-Trichlorobenzene	B	S/P	II	4m	PV	Restr	A, B, C	.409, .440, .526, .908(b)	I-D
1,1,1-Trichloroethane	B	P	III	NR	Open	Open	A	None	I-D
1,1,2-Trichloroethane	B	S/P	III	B/3	PV	Restr	NSR	.525, .526, .1020	I-D
Trichloroethylene	B	S/P	III	B/3	PV	Restr	NSR	.316, .525, .526, .1020	I-D
1,2,3-Trichloropropane	B	S/P	II	B/3	PV	Closed	A, B, C, D	.316, .408, .525, .526, .1020	I-D
1,1,2-Trichloro-1,2,2-trifluoroethane	C	P	III	NR	Open	Open	NSR	None	NA
Tricresyl phosphate (less than 1% of the ortho isomer).	A	P	II	NR	Open	Open	A	.409	I-D[16]
Tricresyl phosphate (1% or more of the ortho isomer).	A	S/P	I	4m	PV	Closed	A, B	.408, .525(a), (c), (d), (e), .1020	I-D[16]
Tridecylbenzene	[C]	P	III	NR	Open	Open	NSR	.440, .908(b)	I-D[16]
Triethanolamine	D	S	III	NR	Open	Open	A	.236(a), (b), (c), (g)	I-C[16]
Triethylamine	C	S/P	II	B/3	PV	Restr	A, B, C	.236(b), (c), .525, .526, .527, .1020	I-C
Triethylbenzene	A	P	II	NR	Open	Open	A	.409	I-D
Triethylene glycol di-(2-ethylbutyrate)	[C]	P	III	NR	Open	Open	A	None	I-C[16]
Triethylenetetramine	D	S	III	NR	Open	Open	A	.236(a), (b), (c)	I-C[16]
Triethyl phosphite	#	S	III	B/3	PV	Restr	A, B, D	.526	NA
Trimethylacetic acid	D	S	III	4m	PV	Restr	A, C	.238(a), .266, .554	I-D
Trimethylbenzenes (all isomers)	B	P	III	4m	PV	Restr	A	.409	I-D
Trimethylhexamethylenediamine (2,2,4- and 2,4,4- isomers).	D	S	III	NR	Open	Open	A, C	.236 (a), (b), (c), (g), .409	NA
Trimethylhexamethylene diisocyanate (2,2,4- and 2,4,4- isomers)[13].	B	S/P	II	B/3	PV	Closed	A, C[13]	.316, .500, .501, .525, .526, .602, .1000, .1020	NA
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate.	C	P	III	NR	Open	Open	A	None	I-D
Trimethyl phosphite	#	S	III	4m	PV	Restr	A, D	.409, .526, .602, .1000	I-D
Tritolyl phosphate see Tricresyl phosphate.									

Trixylenyl phosphate	A	P	I	NR	Open	Open	A	.408	NA
Trixylyl phosphate *see* Trixylenyl phosphate.									
Turpentine	B	P	III	4m	PV	Restr	A	.409	I-D
Undecanoic acid	C	P	III	NR	Open	Open	A	.440, .903, .908(a), (b)	NA
1-Undecene	B	P	III	NR	Open	Open	A	None	I-D
Undecyl alcohol	B	P	III	NR	Open	Open	A	.440, .908(b)	I-D
Undecylbenzene	[C]	P	III	NR	Open	Open	A	None	I-D[16]
Urea, Ammonium nitrate solution (containing more than 2% NH_3).	C	S/P	III	4m	PV	Restr	A	.236(b), .526	I-D
iso-Valeraldehyde	C	S/P	III	4m	PV	Restr	A	.500, .526	I-C
n-Valeraldehyde	D	S	III	4m	PV	Restr	A	.500, .526	I-C
Vinyl acetate	C	S/P	III	4m	PV	Open	A	.912(a)(1), .1002 (a), (b), .1004	**I-D**
Vinyl ethyl ether	C	S/P	II	4m	PV	Closed	A	.236(b),(d),(f),(g), **.252,** .372, .408, .440, .500, .515, .526, .527, .912(a)(1), .1002 (a), (b), .1004.	I-C[16]
Vinylidene chloride	B	S/P	II	4m	PV	Restr	B	.236 (a), (b), .372, .440, .550, .526, .527, .912(a)(1), .1002 (a), (b), .1004.	I-D
Vinyl neodecanate	C	S/P	III	NR	Open	Open	**A, B**	.912(a)(1), .1002 (a), (b), .1004	NA
Vinyltoluene	A	S/P	III	4m	PV	Restr	**A, B, D**	.236 (a), (b), (c), (g), .409, .912(a)(1), .1002(a), (b), .1004.	I-D
White spirit (low (15–20%) aromatic)	B	P	II	4m	PV	Restr	A	.409	NA
Xylenes[17] (*ortho-, meta-, para-*)	C	P	III	4m	PV	Restr	A	.409, .440, .908(b)[17]	I-D
Xylenol	B	S/P	III	NR	Open	Open	**A, B**	.440, .908(a), (b)	NA

Items in **boldface** are changes.

COLUMN HEADING FOOTNOTES:

[1] The cargo name must be as it appears in this column **(see 153.900, 153.907).** Words in italics are not part of the cargo name but may be used in addition to the cargo name. When one entry references another entry by use of the word "*see*", and both names are in roman type, either name may be used as the cargo name (e.g., Diethyl ether *see* Ethyl ether). However, the referenced entry is preferred.

[2] This column lists the IMO Annex II Pollution Category.

A, B, C, D—NLS Category of Annex II of MARPOL 73/78.

III—Appendix III of Annex II (non-NLS cargoes) of MARPOL 73/78.

#—No determination of NLS status. For shipping on an oceangoing vessel, see 46 CFR 153.900(c).

[ ]—A NLS category in brackets indicates that the product is provisionally categorized and that further data are necessary to complete the evaluation of its pollution hazards. Until the hazard evaluation is completed, the pollution category assigned is used.

@—The NLS category has been assigned by the U.S. Coast Guard, in absence of one assigned by the IMO. The category is based upon a GESAMP Hazard Profile or by analogy to a closely related product having an NLS assigned.

[3] This column lists the hazard(s) of the commodity:

S—The commodity is included because of its safety hazards.

P—The commodity is included because of its pollution hazards.

S/P—The commodity is included because of both its safety and pollution hazards.

[4] This column lists the type of containment system the cargo must have (see 153.230 through 153.232).

[5] This column lists the height of any vent riser required (see 153.350 and 153.351).

[6] This column lists any vent control valve required (see 153.355).

[7] This column lists the type of gauging system required (see 153.400 through 153.406).

[8] This column lists the type of fire protection system required. Where more than one system is listed, any listed system may be used. A dry chemical system may not be substituted for either type of foam system unless the dry chemical system is listed as an alternative or the substitution is approved by Commandant (G-MTH) (153.460). The types are as follows:

A is a foam system for water soluble cargoes (polar solvent foam).

B is a foam system for water insoluble cargoes (non-polar solvent foam).

C is a water spray system.
D is a dry chemical system.
NSR means there is no special requirement applying to fire protection systems.

[9] This column lists sections that apply to the cargo in addition to the general requirements of this part. The 153 Part number is omitted.

[10] This column lists the electrical hazard class and group used for the cargo when determining requirements for electrical equipment under Subchapter J (Electricial engineering) of this chapter.

Abbreviations used:

NR—No requirement.
NA—Not applicable.

FOOTNOTES OF SPECIFIC CARGOES:

[11] Dry chemical extinguishers should not be used on fires involving this cargo since some dry chemicals may react with the cargo and cause an explosion.

[12] The I-B electrical hazard for acids does not apply to weather deck locations. See 46 CFR Part 111.

[13] Water is effective in extinguishing open air fires but will generate hazardous quantities of gas if put on the cargo in enclosed spaces.

[14] Aluminum is a questionable material of construction with this cargo since pitting and corrosion have been reported. The IMO Chemical Code prohibits aluminum as a material of construction for this cargo.

[15] Some tank pitting has been reported when this cargo is contaminated with water, including moisture in the air. The IMO Chemical Code requires that the vapor space over this cargo be kept dry.

[16] Electrical Hazard Class and Group based upon that which appears in "Classification of Gasas, Liquids and Volatile Solids Relative to Explosion-Proof Electrical Equipment", Publication NMAB 353-5, National Academy Press, 1982, but not appearing in NFPA 497M, "Manual for Classification of Gases, Liquids and Dusts for Electrical Equipment in Hazardous Classified Locations." See also Subchapter J (Electrical Engineering) of this chapter.

[17] Special requirement .908(b) only applies to the para isomer, and mixtures containing the para isomer having a melting point of 0 deg C (32 deg F) or more.

[18] Special applicability:

153.440 and .908(a) apply to the chemical, and mixtures containing the chemical, with a viscosity of 25 mPa.s at 20 deg C (68 deg F).
153.440 and .908(b) apply to the chemical, and mixtures containing the chemical, with a melting point of 0 deg C (32 deg F) and above.
153.448 applies to the chemical, and mixtures containing the chemical, with a melting point of 15 deg C (59 deg F) and above.

[19] Dinitrotoluene should not be carried in deck tanks.

ABBREVIATIONS FOR NOXIOUS LIQUID CARGOES:

N.F.—non-flammable (flash point greater than 60 degrees C (140 degrees F) cc).
F.—flammable (flash point less than or equal to 60 degrees C (140 degrees F) cc).
n.o.s.—not otherwise specified.
ST—Ship type.
Cat—Pollution category.

[CGD 88-100, 54 FR 40042, Sept. 29, 1989]

TABLE 2—CARGOES NOT REGULATED UNDER SUBCHAPTERS D OR O OF THIS CHAPTER WHEN CARRIED IN BULK ON NON-OCEANGOING BARGES

The cargoes listed in this table are not regulated under Subchapter D or O of this title when carried in bulk on non-oceangoing barges. Category A, B, or C noxious liquid substance (NLS) cargo, as defined in § 153.2 of this chapter, listed in this table, or any mixture containing one or more of these cargoes, must be carried under this subchapter if carried in bulk on an oceangoing ship. Requirements for Category D NLS cargoes and mixtures of non-NLS cargoes with Category D NLS cargoes are in 33 CFR Part 151.

Cargoes	Pollution Category
2-Amino-2-hydroxymethyl-1,3-propanediol solution.	III
Ammonium hydrogen phosphate solution	[III]
Ammonium nitrate solution (45% or less)	D
Ammonium nitrate, Urea solution (2% or less NH_3).	D
Ammonium phosphate solution	#
Ammonium phosphate, Urea solution	D
Ammonium polyphosphate solution	@D
Ammonium sulfate solution (20% or less)	D
Apple juice	III
Calcium bromide solution	III
Calcium carbonate slurry	III
Calcium chloride solution	III
Calcium hydroxide slurry	D
Calcium nitrate, Magnesium nitrate, Potassium chloride solution.	III
Chlorinated paraffins (C14-C17) (with 52% Chlorine).	III
2-Chloro-4-ethylamino-6-isopropylamino-5-triazine solution.	#
Choline chloride solution	D
Clay slurry	III
Coal slurry	III
Dextrose solution	III
Diethylenetriamine pentaacetic acid, pentasodium salt solution.	III
1,4-Dihydro-9,10-dihydroxy anthracene, disodium salt solution.	D
Dodecenylsuccinic acid, dipotassium salt solution.	D
Drilling brine (containing Calcium, Potassium, or Sodium salts).	III
Drilling brine (containing Zinc salts)	A
Drilling mud (low toxicity) (*if non-flammable and non-combustible*).	[III]
Ethylenediaminetetraacetic acid, tetrasodium salt solution.	D
Ethylene-Vinyl acetate copolymer (*emulsion*)	III
Formic hydroxyethylethylene diamine triacetic acid, trisodium salt solution.	D
Fish solubles (*water based fish meal extracts*)	[D]
Fructose solution	#
Glucose solution	III
Glycine, sodium salt solution	III
Hexamethylenediamine adipate	D
N-(Hydroxyethyl)ethylenediamine triacetic acid, trisodium salt solution.	D
Kaolin clay solution	III
Kaolin slurry	III
Kraft pulping liquor (free alkali content, 1% or less) *including: Black, Green, or White liquor.*	#
Lignin liquor (free alkali content, 1% or less) *including:*	#
Calcium lignosulfonate solution	@III
Sodium lignosulfonate solution	@III
Lignin sulfonic acid, sodium salt solution	III
Magnesium chloride solution	III
Magnesium hydroxide slurry	III
Milk	III
Molasses	III
Molasses residue (*from fermentation*)	[III]
Noxious liquid, n.o.s. (17) ("trade name," contains "principal components"), Category D (*if non-flammable or non-combustible*).	D
Non-noxious liquid, n.o.s. (18) ("trade name," contains "principal components"), Appendix III (*if non-flammable or non-combustible*).	III
Pentasodium salt of Diethylenetriamine pentaacetic acid solution, *see* Diethylenetriamine pentaacetic acid, pentasodium salt solution.	III
Polyaluminum chloride solution	III
Sewage sludge,treated (*treated so as to pose no additional decompositional and fire hazard; stable, non-corrosive, non-toxic, non-flammable*).	#
Silica slurry	[III]
Sludge,treated (*treated so as to pose no additional decompositional and fire hazard; stable, non-corrosive, non-toxic, non-flammable*).	#
Sodium aluminosilicate slurry	III
Sodium carbonate solution	D
Sodium naphthenate solution (free alkali content, 3% or less) *see* Naphthenic acid, sodium salt solution.	A
Sodium polyacrylate solution	[III]
Sodium silicate solution	D
Sodium sulfate solution	[III]
Sorbitol solution	III
Tetrasodium salt of Ethylenediaminetetraacetic acid solution, *see* Ethylenediaminetetraacetic acid, tetrasodium salt solution.	D
1,1,1-Trichloroethane	B
1,1,2-Trichloro-1,2,2-trifluoroethane	C
Trisodium salt of N-(Hydroxyethyl)-ethylenediaminetriacetic acid solution, *see* N-(Hydroxyethyl)ethylenediamine triacetic acid, trisodium salt solution.	D
Urea, Ammonium mono- and di-hydrogen phosphate, Potassium chloride solution.	D
Urea, Ammonium nitrate solution (2% or less NH_3). *see also Ammonium nitrate,* Urea solution (2% or less).	D
Urea, Ammonium phosphate solution, see also Ammonium phosphate, Urea solution.	D
Urea solution	III
Vanillan black liquor (free alkali content, 1% or less).	#
Vegetable protein solution (*hydrolysed*)	III
Water	III
Zinc bromide, Calcium bromide solution *see* Drilling brine (containing Zinc salts).	A

Explanation of Symbols: As used in this table, the following stand for:

A, B, C, D—NLS Category of Annex II of MARPOL 73/78.

I—Considered an "oil" under Annex I of MARPOL 73/78.

III—Appendix III of Annex II (non-NLS cargoes) of MARPOL 73/78.

LFG—Liquefied flammable gas.

#—No determination of NLS status. For shipping on an oceangoing vessel, see 46 CFR 153.900(c).

[]—A NLS category in brackets indicates that the product is provisionally categorized and that further data are necessary to complete the evaluation of its pollution hazards. Until the hazard evaluation is completed, the pollution category assigned is used.

@—The NLS category has been assigned by the U.S. Coast Guard, in absence of one assigned by the IMO. The category is based upon a GESAMP Hazard Profile or by analogy to a closely related product having an NLS assigned.

[CGD 88-100, 54 FR 40042, Sept. 29, 1989; CGD 88-100, 54 FR 43584, Oct. 26, 1989; 55 FR 17276, Apr. 24, 1990]

APPENDIX I [RESERVED]

APPENDIX II [RESERVED]

APPENDIX III—METRIC UNITS USED IN PART 153

Parameter	Metric (SI unit)	Abbreviation	Equivalent to , English or common metric
Force	Newton	N	0.225 lbs.
Length	Meter	m	39.37 in.
	Centimeter	cm	.3937 in.
Pressure	Pascal	Pa	1.450×10^{-4} lbs/in^2.
	Kilo-Pascal (1,000 Pascals).	kPa	0.145 lbs/in^2.
	Kilo-Pascal	kPa	1.02×10^{-2} kg/cm^2.
	do	kPa	1×10^3 N/m^2.
Temperature	Degree Celsius	° C	5/9 (°F-32).
Viscosity	milli-Pascal second.	mPa.sec	1.0 centipoise.
Volume	Cubic meter	m^3	264 gallons (gal).
	do	m^3	35.3 ft^3.

[CGD 73-96, 42 FR 49027, Sept. 26, 1977, as amended by CGD 78-128, 47 FR 21212, May 17, 1982; CGD 81-101, 52 FR 7799, Mar. 12, 1987]

PART 154—SAFETY STANDARDS FOR SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES

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Table 4—Summary of Minimum Requirement

Appendix A—Equivalent Stress

Appendix B—Stress Analyses Definitions

Authority: 46 U.S.C. 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; 49 CFR 1.46.

Source: CGD 74-289, 44 FR 26009, May 3, 1979, unless otherwise noted.

Editorial Note: Nomenclature changes affecting Part 154 appear at CGD 82-072, 47 FR 28676, July 1, 1982.

Subpart A—General

Source: CGD 77-069, 52 FR 31626, Aug. 21, 1987, unless otherwise noted.

§ 154.1 Incorporation by reference.

(a) Certain materials are incorporated by reference into this part with approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a). The Office of the Federal Register publishes a list "Material Approved for Incorporation by Reference," which appears in the Finding Aids section of this volume. To enforce any edition other than the one listed in paragraph (b) of this section, notice of change must be published in the Federal Register and the material made available. All approved material is on file at the Office of the Federal Register, Washington, DC 20408, and at the Commandant (G-MTH), U.S. Coast Guard, Washington, DC 20593-0001.

(b) The materials approved for incorporation by reference in this part are:

American Bureau of Shipping

45 Eisenhower Drive, Paramus, NJ 07652
Rules for Building and Classing Steel Vessels, 1981

American National Standards Institute

1430 Broadway, New York, NY, 10018

ANSI Z89.1-69 Safety Requirements for Industrial Head Protection, 1969

ANSI Z87.1-79 Practice for Occupational and Educational Eye and Face Protection, 1979

American Society for Testing and Materials

1916 Race St., Philadelphia, PA 19103.

ASTM A20-1978 Steel Plates for Pressure Vessels.

ASTM F1014-1986 Standard Specification for Flashlights on Vessels.

Sections effected—154.1400(a)(4), 154.1400(b)(4), 154.1400(c)(4).

Note: All other documents referenced in this part are still in effect.

International Maritime Organization

4 Albert Embankment, Lndon SE1 75R, U.K.

Resolution A.328(IX), Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, 1976

Code For Existing Ships Carrying Liquefied Gases in Bulk, 1976

Medical First Aid Guide for Use in Accidents Involving Dangerous Goods

Underwriters Laboratories, Inc.

333 Pfingsten Rd., Northbrook, IL 60062

UL No. 783-79 Standard for Safety, Electric Flashlights for Use in Hazardous Locations, Class 1, Groups C and D, 1979.

[CGD 77-069, 52 FR 31626, Aug. 21, 1987, as amended by CGD 82-042, 53 FR 17705, May 18, 1988; CGD 82-042, 53 FR 18949, May 25, 1988; CGD 88-070, 53 FR 34535, Sept. 7, 1988]

§ 154.3 Purpose.

The purpose of this part is to prescribe rules for new and existing gas vessels.

§ 154.5 Applicability.

This part applies to each self-propelled vessel that has on board bulk liquefied gases as cargo, cargo residue or vapor, except Subpart C does not apply if the vessel meets § 154.12 (b), (c), or (d).

§ 154.7 Definitions, acronyms, and terms.

As used in this part:

"'A' Class Division" means a division as defined in Regulation 3 of Chapter II-2 of the 1974 Safety Convention.

"Accommodation spaces" means public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, game and hobby rooms, pantries containing no cooking appliances, and spaces used in a similar fashion.

"Boiling point" means the temperature at which a substance's vapor pressure is equal to the atmospheric barometric pressure.

"Breadth" (B) means the maximum width of the vessel in meters measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

"Cargo area" means that part of the vessel that contains the cargo containment system, cargo pump rooms, cargo compressor rooms, and the deck areas over the full beam and the length of the vessel above them, but does not include the cofferdams, ballast spaces, or void spaces at the after end of the aftermost hold space or the forward end of the forwardmost hold space.

"Cargo containment system" means the arrangement for containment of the cargo including a primary and secondary barrier, associated insulation and any intervening spaces, and adjacent structure that is necessary for the support of these elements.

"Cargo service space" means space within the cargo area that is more than 2 m² (21.5 ft.²) in deck area and used for work shops, lockers, or store rooms.

"Cargo tank" means the liquid tight shell that is the primary container of the cargo.

"Certificate of Compliance" means a certificate issued by the Coast Guard to a foreign flag vessel after it is examined and found to comply with regulations in this chapter.

"Cofferdam" means the isolating space between two adjacent steel bulkheads or decks, which could be a void space or a ballast space.

"Contiguous hull structure" includes the inner deck, the inner bottom plating, longitudinal bulkhead plating, transverse bulkhead plating, floors, webs, stringers, and attached stiffeners.

"Control space" means those spaces in which the vessel's radio, main navigating equipment, or the emergency source of power is located or in which the fire control equipment, other than firefighting control equipment under § 154.1140 to § 154.1170, is centralized.

"Design temperature" means the minimum cargo temperature the Coast Guard allows for loading, unloading, or carriage.

"Design vapor pressure" (P_o) means the maximum gauge pressure at the top of the cargo tank for the design of the cargo tank.

"Document" means a Certificate of Inspection for a U.S. flag vessel or a Certificate of Compliance for a foreign flag vessel.

"Existing gas vessel" means a self-propelled vessel that—

(a) Is delivered on or before October 31, 1976; or

(b) Is delivered between October 31, 1976 and June 30, 1980, and is not a new gas vessel.

"Flammable cargoes" includes the following liquefied gases from Table 4 (follows § 154.1872):

Acetaldehyde
Butadiene
Butane
Butylene
Dimethylamine
Ethane
Ethylamine
Ethyl chloride
Ethylene
Ethylene oxide
Methane (LNG)
Methyl acetylene-propadiene mixture
Methyl bromide
Methyl chloride
Propane
Propylene
Vinyl chloride

"Gas-dangerous space" includes the following spaces:

(a) A space in the cargo area without arrangements to provide a safe atmosphere at all times.

(b) An enclosed space outside the cargo area through which any piping that may contain liquid or gaseous cargo passes, or within which that piping terminates, without arrangements to prevent gas from escaping into the space.

(c) A cargo containment system and cargo piping.

(d) A hold space where cargo is carried in a cargo containment system:

(1) With a secondary barrier; or

(2) Without a secondary barrier.

(e) A space separated from a hold space under paragraph (d)(1) of this definition by a single gastight boundary.

(f) A cargo pumproom and a cargo compressor room.

(g) A zone on the weather deck or a semi-enclosed space on the weather deck within 3.05 m (10 ft) of any cargo tank outlet, gas or vapor outlet, cargo pipe flange, cargo valve, or of entrances and ventilation openings to a cargo pump room or a cargo compressor room.

(h) Except for existing gas vessels, the weather deck over the cargo area and 3.05 m (10 ft) forward and aft of the cargo area on the weather deck to 2.4 m (8 ft) above the weather deck.

(i) A zone within 2.4 m (8 ft) of the outer surface of a cargo containment system where the surface is exposed to the weather.

(j) An enclosed or semi-enclosed space in which there is piping containing cargo, except those—

(1) With gas sampling lines for gas detection equipment under § 154.1350(n); or

(2) In which boil-off gas is used as fuel under § 154.703.

(k) A space for storage of cargo hoses.

(l) An enclosed or semi-enclosed space having an opening into any gas-dangerous space or zone.

"Gas-safe space" means a space that is not a gas-dangerous space.

"Hold space" means the space enclosed by the vessel's structure in which there is a cargo containment system.

"IMO" stands for the International Maritime Organization.

"IMO Certificate" means a Certificate of Fitness for the Carriage of Liquefied Gases in Bulk issued under the IMO—

(a) "Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk", adopted November 12, 1975 by Assembly Resolution A.328(IX), as amended;

(b) "Code for Existing Ships Carrying Liquefied Gases in Bulk", adopted November 12, 1975, as amended; or

(c) "Recommendations Concerning Ships Not Covered by the Code for the Construction and Equipment of Ships

Carrying Liquefied Gases in Bulk", (Resolution A.328(IX)), adopted November 12, 1975 by Assembly Resolution A.329(IX).

"Independent tank" is a cargo tank that is permanently affixed to the vessel, is self-supporting, and is not part of the hull or essential to the strength or integrity of the hull.

"Independent tank type A" is an independent cargo tank designed primarily using classification society classical ship structural analysis procedures.

"Independent tank type B" is an independent cargo tank designed from model tests, refined analytical tools, and analysis methods to determine stress levels, fatigue life, and crack propagation characteristics.

"Independent tank type C" (pressure tank) is an independent cargo tank meeting pressure vessel criteria where the dominant stress producing load is design vapor pressure.

"Insulation space" means a space, that could be an interbarrier space, occupied wholly or in part by insulation.

"Integral tank" means a cargo tank that is a structural part of the vessel's hull and is influenced in the same manner and by the same loads that stress the adjacent hull structure.

"Interbarrier space" means the space between a primary and a secondary barrier, with or without insulation or other material.

"Length (L)" is ninety-six percent of the total length in meters on a waterline at eighty-five percent of the least molded depth measured from the top of the keel or the length from the foreside of the stem to the axis of the rudder stock on the waterline, whichever is greater. In vessels having a rake of keel, the waterline is parallel to the design waterline.

"Liquefied gas" means a cargo having a vapor pressure of 172 kPa (25 psia) or more at 37.8 °C (100 °F).

"MARVS" stands for the Maximum Allowable Relief Valve Setting.

"Membrane tank" is a cargo tank that is not self-supporting and consists of a thin layer (membrane) supported through insulation by the adjacent hull structure.

"New gas vessel" means a self-propelled vessel that—

(a) Is constructed under a building contract awarded after October 31, 1976;

(b) In the absence of a building contract, has a keel laid or is at a similar stage of construction after December 31, 1976;

(c) Is delivered after June 30, 1980; or

(d) Has undergone a major conversion for which—

(1) The building contract is awarded after October 31, 1976;

(2) In the absence of a building contract, conversion is begun after December 31, 1976; or

(3) Conversion is completed after June 30, 1980.

"Primary barrier" means the inner boundary that contains the cargo when the cargo containment system includes two boundaries.

"Process pressure vessel" means a pressure vessel that is used in a reliquefaction, cargo heating, or other system that processes cargo.

"Remote group alarm" means an audible and visual alarm that alerts when an alarm condition exists but does not identify that condition.

"Secondary barrier" means the liquid resisting outer boundary of a cargo containment system when the cargo containment system includes two boundaries.

"Semi-membrane tank" is a cargo tank that is not self-supporting and that can expand and contract due to thermal, hydrostatic, and pressure loadings. It consists of flat surfaces, supported through insulation by the adjacent hull structure, and shaped corners that connect the flat surfaces.

"Service space" means a space outside the cargo area that is used for a galley, pantry containing cooking appliances, locker or store room, workshop except those in machinery spaces, and similar spaces and trunks to those spaces.

"Shut-off valve" is a valve that closes a pipeline and provides nominal metal to metal contact between the valve operating parts, including the disc and gate, and the valve body.

"Specific gravity" (p) means the ratio of the density of the cargo at the design temperature to the density of water at 4 °C (39 °F).

"Tank cover" is the structure protecting those parts of the cargo containment system that protrude through the weather deck and providing continuity to the deck structure.

"Tank dome" means the uppermost portion of the cargo tank. For below deck cargo containment systems, it means the uppermost portion of the cargo tank that protrudes through the weather deck or through the tank cover.

"Toxic cargoes" includes the following liquefied gases from Table 4 (follows § 154.1872):

Acetaldehyde
Ammonia, anhydrous
Dimethylamine
Ethylamine
Ethyl chloride
Ethylene oxide
Methyl bromide
Methyl chloride
Sulfur dioxide
Vinyl chloride

"Vapor pressure" means the absolute equilibrium pressure of the saturated vapor above the liquid, expressed in kPa (psia), at a specific temperature.

"Void space" means an enclosed space in the cargo area outside of the cargo containment system, except a hold space, ballast space, fuel oil tank, cargo pump or compressor room, or any space used by personnel.

"1974 Safety Convention" stands for the International Convention on Safety of Life at Sea, 1974, done at London, November 1, 1974.

§ 154.9 Issuance of documents.

The Coast Guard issues an endorsed Certificate of Inspection to a U.S. flag vessel or an endorsed Certificate of Compliance to a foreign flag vessel that meets this part.

§ 154.12 Existing gas vessel: Endorsements and requirements.

(a) Except an existing gas vessel under paragraph (b), (c), or (d) of this section, an existing gas vessel must meet Subpart C of this part if the owner desires a document endorsed for the carriage of a cargo listed in Table (follows § 154.1872).

(b) If an existing gas vessel is issued document by the Coast Guard before November 1, 1987 that is endorsed for the carriage of a cargo listed in Table 4 (follows § 154.1872), and the owner desires the same endorsement on a reissued document, the vessel must—

(1) Continue to meet the same design and construction standards under which the Coast Guard issued the original document; and

(2) Meet paragraph (e) of this section.

(c) If an existing gas vessel is issued a document by the Coast Guard before November 1, 1987 that is endorsed for the carriage of a cargo listed in Table 4 (follows § 154.1872), and the owner desires an endorsement for a different cargo listed in that table, the vessel must—

(1) Continue to meet the same design and construction standards under which the Coast Guard issued the original document;

(2) Meet paragraph (e) of this section;

(3) Meet Subpart D for the different cargo; and

(4) Meet any additional requirements of this part that the Commandant (G-MTH) determines to be necessary for safety.

(d) If an existing gas vessel does not meet paragraph (b) or (c) of this section and the owner desires a document endorsed for the carriage of a cargo listed in Table 4 (follows § 154.1872), the vessel must—

(1) Have a letter from the Coast Guard dated before November 1, 1987 stating that—

(i) Review of the vessel's plans for the carriage of that cargo is completed; or

(ii) The vessel's IMO Certificate endorsed for the carriage of that cargo is accepted;

(2) Meet the plans that were reviewed and marked "Examined" or "Approved" by the Coast Guard, or meet the standards under which the IMO Certificate was issued;

(3) Meet paragraph (e) of this section; and

(4) Meet any additional requirements of this part that the Commandant (G-MTH) determines to be necessary for safety.

(e) If the owner of a vessel desires any document endorsement described in paragraph (b), (c), or (d) of this section, the existing gas vessel must meet the requirements in each of the following:

(1) Section 154.310 (d) and (e).

(2) Section 154.320 (b) and (c).

(3) Section 154.330 (a) through (e).

(4) Section 154.340(d).

(5) Section 154.345 (a), (b)(1) through (b)(5), (b)(7) and (c).

(6) Section 154.476(a).

(7) Section 154.519(a)(2).

(8) Section 154.534.

(9) Section 154.538.

(10) Section 154.540 (c) and (d).

(11) Section 154.556.

(12) Section 154.558.

(13) Section 154.560.

(14) Section 154.562.

(15) Section 154.703.

(16) Section 154.705.

(17) Section 154.706.

(18) Section 154.707.

(19) Section 154.708.

(20) Section 154.709.

(21) Section 154.904.

(22) Section 154.906.

(23) Section 154.908(a), unless the space is separated from the accommodation, service, or control space by a steel door that—

(i) Is watertight when tested with a firehose at not less than 207 kPa gauge (30 psig);

(ii) Has a means to self-close and does not have latches or other devices designed to hold it open; and

(iii) Has an audible and visual alarm on both sides of the door which is actuated when the door is open.

(24) Section 154.910.

(25) Section 154.912.

(26) Sections 154.1110 through 154.1130, except §§ 154.1115(b), 154.1120(b), and 154.1125 (c) and (f).

(27) Section 154.1145, except an existing gas vessel with a cargo carrying capacity of less than 2500 m ^{3} (88,200 ft ^{3}) may have only one self-contained dry chemical storage unit if that unit—

(i) is installed before November 1, 1987; and

(ii) Has the capacity to meet § 154.1145 (d) and (e), and § 154.1170(e).

(28) Section 154.1150 (a) and (b).

(29) Section 154.1155.

(30) Section 154.1160.

(31) Section 154.1165 (a), (b), (d), and (f).

(32) Section 154.1170 (b) through (f).

(33) Section 154.1200 (a), (b)(1), and (b)(2).

(34) Section 154.1205(f).

(35) Section 154.1325.

(36) Section 154.1335(e).

(37) Section 154.1350 (e), (f), (i), (o), and (u).

§ 154.15 U.S. flag vessel: Endorsement application.

(a) A person who desires the endorsement required under § 154.1801 for a U.S. flag vessel must submit an application for an endorsement of the vessel's Subchapter D Certificate of Inspection under the procedures in § 91.55-15 of this chapter.

(b) The person requesting an endorsement under paragraph (a) of this section must submit to the Coast Guard, if requested—

(1) Calculations for hull design required by § 172.175 of this chapter;

(2) The plans and information listed in §§ 54.01-18, 56.01-10, 91.55-5 (a), (b), (d), (g), and (h), and 110.25-1 of this chapter;

(3) Plans for the dry chemical supply and distribution systems, including the controls; and

(4) Any other vessel information, including, but not limited to plans, design calculations, test results, certificates, and manufacturer's data, needed to determine whether or not the vessel meets the standards of this part.

§ 154.17 U.S. flag vessel: Certificate of Inspection endorsement.

The Certificate of Inspection for a U.S. flag vessel allowed to carry a liquefied gas listed in Table 4 has the following endorsement for each cargo, with the corresponding carriage requirement data inserted:

Inspected and approved for the carriage of _____ at a maximum allowable relief valve setting of _____ kPa gauge (_____ psig) with an F factor of _____, a maximum external pressure of _____ kPa gauge (_____ psig), a minimum service temperature of _____ °C (_____ °F), and a maximum specific gravity of _____. Hull type _____.

§ 154.19 U.S. flag vessel: IMO certificate issuance.

(a) The Coast Guard Officer in Charge, Marine Inspection, issues an IMO Certificate to a U.S. flag vessel when requested by the owner or representative, if—

(1) The vessel meets the requirements of this part; and

(2) It is a new gas vessel, it meets the IMO Resolution A.328(IX), "Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, 1975"; or

(3) It is an existing gas vessel, it meets the IMO "Code for Existing Ships Carrying Liquefied Gases in Bulk, 1975".

(b) The IMO Certificate expires on the same date that the vessel's Certificate of Inspection expires.

§ 154.22 Foreign flag vessel: Certificate of Compliance endorsement application.

(a) A person who desires an endorsed Certificate of Compliance to meet § 154.1802(a) for a foreign flag vessel, whose flag administration issues IMO Certificates, must submit to the Commanding Officer, U.S. Coast Guard Marine Safety Center (G-MSC), 400 Seventh St., SW., Washington, DC 20590-0001, an application that includes the following:

(1) The vessel's valid IMO Certificate.

(2) A description of the vessel.

(3) Specifications for the cargo containment system.

(4) A general arrangement plan of the vessel.

(5) A midship section plan of the vessel.

(6) Schematic plans of the liquid and vapor cargo piping.

(7) A firefighting and safety plan.

(8) If the applicant is requesting an endorsement for the carriage of ethylene oxide, a classification society certification that the vessel meets § 154.1725(a) (4), (5), and (7).

(9) If the vessel is a new gas vessel, or an existing vessel that does not meet § 154.12 (b), (c), or (d)—

(i) A certification from a classification society that the vessel—

(A) Has enhanced grades of steel meeting § 154.170 (b)(1) and (b)(2) for crack arresting purposes in the deck stringer, sheer strake, and bilge strake; and

(B) Meets § 154.701, or if the vessel carries methane, meets § 154.703, by having the capability of cargo tank pressure and temperature control without venting; and

(ii) The vessel's valid SOLAS Cargo Ship Safety Construction Certificate and Cargo Ship Safety Equipment Certificate.

(10) Any additional plans, certificates, and information needed by the Commandant (G-MTH) to determine whether or not the vessel meets this part.

(b) A person who desires an endorsed Certificate of Compliance to meet § 154.1802(b) for a foreign flag vessel, whose flag administration does not issue IMO Certificates, must submit to the Commandant (G-MTH) the plans, calculations, and information under § 154.15(b).

[CGD 77-069, 52 FR 31626, Aug. 21, 1987, as amended by CGD 88-070, 53 FR 34535, Sept. 7, 1988; CGD 89-025, 54 FR 19571, May 8, 1989]

§ 154.24 Foreign flag vessel: IMO Certificate.

(a) An IMO Certificate issued under the IMO Resolution A.328(IX),"Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, 1975" is usually sufficient evidence of compliance with this part for the Coast Guard to endorse a foreign flag vessel's Certificate of Compliance with the name of each cargo in Table 4 (follows § 154.1872) that is listed on the IMO Certificate, if the information listed in item 3 of the IMO Certificate shows that—

(1) The design ambient temperatures meet § 154.174 and § 154.176;

(2) The cargo tank design stress factors and resulting MARVS of independent tanks type B or C meet § 154.447 or § 154.450; and

(3) The cargo tank MARVS of a type IIPG ship meets § 172.175(c) of this chapter.

(b) If a foreign flag existing gas vessel meets § 154.12 (b), (c), or (d), the vessel's IMO Certificate issued under the IMO "Code for Existing Ships Carrying Liquefied Gases in

Bulk, 1975" is usually sufficient evidence of compliance with the requirements of § 154.12(e) for the Coast Guard to endorse the Certificate of Compliance with the name of each cargo in Table 4 (follows § 154.1872) that is listed on the IMO Certificate; however if a foreign flag existing gas vessel does not meet § 154.12 (b), (c), or (d), an IMO Certificate issued under the IMO "Code for Existing Ships Carrying Liquefied Gases in Bulk, 1975" is not acceptable evidence of compliance with the requirements of this part for the endorsement of a Certificate of Compliance.

§ 154.30 Liquefied gases not included in Table 4.

(a) A liquefied gas not appearing in Table 4 (follows § 154.1872) must be specially approved by the Commandant (G-MTH) to be carried in bulk in U.S. waters.

(b) A person who desires to ship a liquefied gas in bulk that is not listed in Table 4 must submit to the Commandant (G-MTH) a completed form CG-4355. This form may be obtained from the Commandant (G-MTH) or any Officer in Charge, Marine Inspection (OCMI).

(c) The Commandant (G-MTH) notifies the submitter by letter whether or not the liquefied gas is specially approved for carriage in bulk in U.S. waters and the minimum requirements for that carriage. If the liquefied gas is not specially approved, the reasons why the special approval is not granted are included.

§ 154.32 Equivalents.

(a) A vessel that fails to meet the standards in this part for an endorsement on a Certificate of Inspection or a Certificate of Compliance may meet an alternate standard if the Commandant (G-MTH) finds that the alternate standard provides an equivalent or greater level of protection for the purpose of safety.

(b) The Commandant (G-MTH) considers issuance of a finding of equivalence to the standard required by this part if the person requesting the finding submits a written application to the Commandant (G-MTH) that includes—

(1) A detailed explanation of the vessel's characteristics that do not meet the requirements in this part; and

(2) An explanation of how each substituted standard would enable the vessel to meet a level of safety that would be equivalent to or greater than the standard in this part.

(c) Operational methods or procedures may not be substituted for a particular fitting, material, appliance, apparatus, item, or type of equipment required in this part.

§ 154.34 Special approval: Requests.

Each request for special approval must be in writing and submitted to the Commandant (G-MTH), U.S. Coast Guard, 2100 Second Street SW., Washington, DC 20593-0001.

§ 154.36 Correspondence and vessel information: Submission.

Correspondence to the Coast Guard and all vessel information submitted to the Coast Guard must be in English, except—

(a) IMO Certificates may be in French; and

(b) SOLAS Certificates may be in the official language of the flag administration.

§ 154.40 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88-033, 54 FR 50381, Dec. 6, 1989]

Subpart B—Inspections and Tests

EXAMINATION REQUIREMENTS FOR FOREIGN FLAG VESSELS

§ 154.150 Examination required for a Certificate of Compliance.

Before a vessel receives an initial or reissued Certificate of Compliance endorsed with the name of a cargo from Table 4 of this part, the vessel must call at a United States port for an examination, during which the Officer in Charge, Marine Inspection, determines whether or not the vessel meets the requirements of this chapter.

[CGD 81-052, 50 FR 8734, Mar. 5, 1985]

§ 154.151 Procedures for having the Coast Guard examine a vessel for a Certificate of Compliance.

To have the Coast Guard examine the vessel for a Certificate of Compliance, as required in § 154.150, the owner of a foreign flag vessel must proceed as follows:

(a) After submitting an application under § 154.22, await notification by the Commandant (G-MTH) that review of the vessel's plans or IMO Certificate and supporting documents is complete.

(b) Except when paragraph (c) of this section applies,

(1) After receiving notification from Commandant (G-MTH) that review is complete and the application is acceptable, dispatch the vessel to a United States port;

(2) Notify the Officer in Charge, Marine Inspection, for the port where the vessel is to be inspected at least seven days before the vessel arrives and arrange the exact time and other details of the examination. This notification is in addition to any other pre-arrival notice to the Coast Guard required by other regulations and must include:

(i) The name of the vessel's first U.S. port of call;

(ii) The date the vessel is scheduled to arrive;

(iii) The name and telephone number of the owner's local agent; and

(iv) The names of all cargoes listed in Table 4 of this part that are on board the vessel;

(3) Make sure that the following items are available on board the vessel for the use of the Marine Inspector before beginning the examination required by § 154.150:

(i) A general arrangement (including the location of firefighting, safety, and lifesaving gear); and

(ii) The cargo manual required by § 154.1810.

(c) If the vessel was accepted for U.S. service on the basis of Coast Guard plan review under § 154.5(b), the vessel owner must notify Commandant (G-MTH) fourteen days prior to the vessel's arrival at a U.S. port. This notification must include:

(1) The name of the vessel's first U.S. port of call;

(2) The date the vessel is scheduled to arrive;

(3) The name and telephone number of the owner's local agent; and

(4) The names of all cargoes listed in Table 4 of this part that are on board the vessel.

[CGD 81-052, 50 FR 8734, Mar. 5, 1985; 50 FR 15895, Apr. 23, 1985; CGD 77-069, 52 FR 31630, Aug. 21, 1987]

Subpart C—Design, Construction and Equipment

HULL STRUCTURE

§ 154.170 Outer hull steel plating.

(a) Except as required in paragraph (b) of this section, the outer hull steel plating, including the shell and deck plating must meet the material standards of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels" 1981.

(b) Along the length of the cargo area, grades of steel must be as follows:

(1) The deck stringer and sheer strake must be at least Grade E steel or a grade of steel that has equivalent chemical properties, mechanical properties, and heat treatment, and that is specially approved by the Commandant (G-MTH).

(2) The strake at the turn of the bilge must be Grade D, Grade E, or a grade of steel that has equivalent chemical properties, mechanical properties, and heat treatment, and that is specially approved by the Commandant (G-MTH).

(3) The outer hull steel of vessels must meet the standards in § 154.172 if the hull steel temperature is calculated to be below −5° C (23° F) assuming:

(i) For any waters in the world, the ambient cold conditions of still air at 5° C (41° F) and still sea water at 0° C (32° F);

(ii) For cargo containment systems with secondary barriers, the temperature of the secondary barrier is the design temperature; and

(iii) For cargo containment systems without secondary barriers, the temperature of the cargo tank is the design temperature.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.172 Contiguous steel hull structure.

(a) Except as allowed in paragraphs (b) and (c) of this section, plates, forgings, forged and rolled fittings, and rolled and forged bars and shapes used in the construction of the contiguous steel hull structure must meet the thickness and steel grade in Table 1 for the temperatures under §§ 154.174(b) and 154.176(b).

(b) for a minimum temperature, determined under §§ 154,174(b) and 154.176(b), below −25° C (−13° F), the contiguous steel hull structure must meet § 54.25-10 for that minimum temperature.

(c) If a steel grade that is not listed in Table 1 has the equivalent chemical properties, mechanical properties, and heat treatment of a steel grade that is listed, the steel grade not listed may be specially approved by the Commandant (G-MTH), for use in the contiguous hull structure.

Table 1—MINIMUM TEMPERATURE, THICKNESS, AND STEEL GRADES IN CONTIGUOUS HULL STRUCTURES

Minimum temperature	Steel thickness	Steel[1] grade
0° C (32° F)	All	Standards of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981
−10° C (14° F).	T<112.5 mm (½ in.).	B
	12.5<t<25.5 mm (1 in.).	D
	t>25.5 mm (1 in.)	E
−25° C (−13° F).	t<112.5 mm (½ in.).	D
	t>12.5 mm (½ in.)	E

[1] Steel grade of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.174 Transverse contiguous hull structure.

(a) The transverse contiguous hull structure of a vessel having cargo containment systems without secondary barriers must meet the standards of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981.

(b) The transverse contiguous hull structure of a vessel having cargo containment systems with secondary barriers must be designed for a temperature that is:

(1) Colder than the calculated temperature of this hull structure when:

(i) The temperature of the secondary barrier is the design temperature, and

(ii) The ambient cold condition under § 154.176(b)(1)(ii) and (iii) are assumed; or

(2) Maintained by the heating system under § 154.178.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.176 Longitudinal contiguous hull structure.

(a) The longitudinal contiguous hull structure of a vessel having cargo containment systems without secondary barriers must meet the standards of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981.

(b) The longitudinal contiguous hull structure of a vessel having cargo containment systems with secondary barriers must be designed for a temperature that is:

(1) Colder than the calculated temperature of this hull structure when:

(i) The temperature of the secondary barrier is the design temperature; and

(ii) For any waters in the world except Alaskan waters, the ambient cold condition of:

(A) Five knots air at −18° C (0° F); and

(B) Still sea water at 0° C (32° F); or

(iii) For Alaskan waters the ambient cold condition of:

(A) Five knots air at −29° C (−20° F); and

(B) Still sea water at −2° C (28° F); or

(2) Maintained by the heating system under § 154.178, if, without heat, the contiguous hull structure is designed for a temperature that is colder than the calculated temperature of the hull structure assuming the:

(i) Temperature of the secondary barrier is the design temperature; and

(ii) Ambient cold conditions of still air at 5° C (41° F) and still sea water at 0° C (32° F).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.178 Contiguous hull structure: Heating system.

The heating system for transverse and longitudinal contiguous hull structure must:

(a) Be shown by a heat load calculation to have the heating capacity to meet § 154.174(b)(2) or § 154.176(b)(2);

(b) Have stand-by heating to provide 100% of the required heat load and distribution determined under paragraph (a); and

(c) Meet Parts 52, 53, and 54 of this chapter.

§ 154.180 Contiguous hull structure: Welding procedure.

Welding procedure tests for contiguous hull structure designed for a temperature colder than −18° C (0° F) must meet § 54.05-15 and Subpart 57.03 of this chapter.

§ 154.182 Contiguous hull structure: Production weld test.

If a portion of the contiguous hull structure is designed for a temperature colder than −34° C (−30° F) and is not part of the secondary barrier, each 100m (328 ft.) of full penetration butt welded joints in that portion of the contiguous hull structure must pass the following production weld tests in the position that the joint is welded:

(a) Bend tests under § 57.06-4 of this chapter.

(b) A Charpy V-notch toughness test under § 57.06-5 of this chapter on one set of 3 specimens alternating the notch location on successive tests between the center of the weld and the most critical location in the heat affected zone.[2]

(c) If the contiguous hull structure does not pass the test under paragraph (b) of this section, the retest procedures under § 54.05-5(c) must be met.

§ 154.188 Membrane tank: Inner hull steel.

For a vessel with membrane tanks, the inner hull plating thickness must meet the deep tank requirements of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.195 Aluminum cargo tank: Steel enclosure.

(a) An aluminum cargo tank and its dome must be enclosed by the vessel's hull structure or a separate steel cover.

(b) The steel cover for the aluminum cargo tank must meet the steel structural standards of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981.

(c) The steel cover for the aluminum tank dome must be:

(1) At least 3.2 mm (⅛ in.) thick;

(2) Separated from the tank dome, except at the support points; and

(3) Thermally isolated from the dome.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

SHIP SURVIVAL CAPABILITY AND CARGO TANK LOCATION

§ 154.200 Stability requirements: General.

Each vessel must meet the applicable requirements in Subchapter S of this chapter.

[CGD 79-023, 48 FR 51009, Nov. 4, 1983]

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[2] The most critical location in the heat affected zone of the weld is based on procedure qualification results, except austenitic stainless steel need have notches only in the center of the weld.

§ 154.235 Cargo tank location.

(a) For type IG hulls, cargo tanks must be located inboard of:

(1) The transverse extent of damage for collision penetration specified in Table 172.180 of this chapter;

(2) The vertical extent of damage for grounding penetration specified in Table 172.180 of this chapter; and

(3) 30 inches (760 mm) from the shell plating.

(b) For type IIG, IIPG, and IIIG hulls, cargo tanks must be located inboard of:

(1) The vertical extent of damage for grounding penetration specified in Table 172.180 of this chapter; and

(2) 30 inches (760 mm) from the shell plating.

(c) In vessels having membrane and semi-membrane tanks, the vertical and transverse extents of damage must be measured to the inner hull.

(d) For type IIG, IIPG, and IIIG hulls, cargo tank suction wells may penetrate into the area of bottom damage specified as the vertical extent of damage for grounding penetration in Table 172.180 of this chapter if the penetration is the lesser of 25% of the double bottom height or 13.8 in. (350 mm).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 79-023, 48 FR 51010, Nov. 4, 1983]

SHIP ARRANGEMENTS

§ 154.300 Segregation of hold spaces from other spaces.

Hold spaces must be segregated from machinery and boiler spaces, accommodation, service and control spaces, chain lockers, potable, domestic and feed water tanks, store rooms and spaces immediately below or outboard of hold spaces by a:

(a) Cofferdam, fuel oil tank, or single gastight A-60 Class Division of all welded construction in a cargo containment system not required by this part to have a secondary barrier;

(b) Cofferdam or fuel oil tank in a cargo containment system required by this part to have a secondary barrier; or

(c) If there are no sources of ignition or fire hazards in the adjoining space, single gastight A-0 Class Division of all welded construction.

§ 154.305 Segregation of hold spaces from the sea.

In vessels having cargo containment systems required by this part to have a secondary barrier, hold spaces must be segregated from the sea by:

(a) A double bottom if the cargo tanks meet this part for design temperatures colder than −10° C (14° F); and

(b) Wing tanks if the cargo tanks meet this part for design temperatures colder than −55° C (−67° F).

§ 154.310 Cargo piping systems.

Cargo liquid or vapor piping must:

(a) Be separated from other piping systems, except where an interconnection to inert gas or purge piping is required by § 154.901(a);

(b) Not enter or pass through any accommodation, service, or control space;

(c) Except as allowed under § 154.703, not enter or pass through a machinery space other than a cargo pump or compressor room;

(d) Be in the cargo area except:

(1) As allowed under § 154.703;

(2) Bow and stern loading piping; and

(3) Emergency jettisoning piping.

(e) Be above the weather deck except:

(1) As allowed under § 154.703;

(2) Pipes in a trunk traversing void spaces above a cargo containment system; and

(3) Pipes for draining, venting, or purging interbarrier and hold spaces;

(f) Connect into the cargo containment system above the weather deck except:

(1) Pipes in a trunk traversing void spaces above a cargo containment system; and

(2) Pipes for draining, venting, or purging interbarrier and hold spaces.

(g) Be inboard of the transverse cargo tank location required by § 154.235, except for athwartship shore connection manifolds not subject to internal pressure at sea.

§ 154.315 Cargo pump and cargo compressor rooms.

(a) Cargo pump rooms and cargo compressor rooms must be above the weather deck and must be within the cargo area.

(b) Where pumps and compressors are driven by a prime mover in an adjacent gas safe space:

(1) The bulkhead or deck must be gastight; and

(2) The shafting passing through the bulkhead or deck must be sealed by a fixed oil reservoir gland seal, a pressure grease seal, or another type of positive pressure seal specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.320 Cargo control stations.

(a) Cargo control stations must be above the weather deck.

(b) If a cargo control station is in accommodation, service, or control spaces or has access to such a space, the station must:

(1) Be a gas safe space;

(2) Have an access to the space that meets § 154.330; and

(3) Have indirect reading instrumentation, except for gas detectors.

(c) Cargo control stations, including a room or area, must contain all alarms, indicators, and remote controls associated with each cargo tank that the station controls.

§ 154.325 Accommodation, service, and control spaces.

(a) Accommodation, service, and control spaces must be outside the cargo area.

(b) If a hold space having a cargo containment system, required by this part to have a secondary barrier, is separated from any accommodation, service, or control space by a cruciform joint, there must be a cofferdam providing at least 760 mm (30 inches) by 760 mm (30 inches) clearance on one side of the cruciform joint.

§ 154.330 Openings to accommodation, service, or control spaces.

(a) Entrances, forced or natural ventilation intakes and exhausts, and other openings to accommodation, service, or control spaces, except as allowed in paragraph (c) of this section, must be:

(1) At least L/25 or 3.05m (10 ft) from the athwartship bulkhead facing the cargo area, whichever is farther, except that the distance need not exceed 5m (16.4 ft); and

(2) On a house athwartship bulkhead not facing the cargo area or on the outboard side of the house.

(b) Each port light, located on the athwartship bulkhead of a house facing the cargo area or the house sides within the distance specified in paragraph (a)(1) of this section, must be a fixed type.

(c) Wheelhouse doors and windows that are not fixed may be within the distance specified in paragraph (a)(1) of this section from the athwartship bulkhead of a house facing the cargo area, if they have gaskets and pass a tightness test with a fire hose at not less than 207 kPa gauge (30 psig).

(d) Port lights in the hull plating below the uppermost continuous deck and in the first tier of the superstructure must be a fixed type.

(e) Air intakes and openings into accommodation, service, and control spaces must have metal closures that pass a tightness test with a fire hose at not less than 207 kPa gauge (30 psig).

(f) On liquefied toxic gas vessels, the closures required in paragraph (e) of this section must be capable of being closed from inside the space.

§ 154.340 Access to tanks and spaces in the cargo area.

(a) Each cargo tank must have a manhole from the weather deck, the clear opening of which is at least 600 mm by 600 mm (23.6 in. by 23.6 in.).

(b) Each access into and through a void space or other gas-dangerous space in the cargo area, except spaces described in paragraph (e) of the definition for "gas-dangerous space" in § 154.7, must—

(1) Have a clear opening of at least 600 mm by 600 mm (23.6 in. by 23.6 in.) through horizontal openings, hatches, or manholes;

(2) Have a clear opening of at least 600 mm by 800 mm (23.6 in. by 31.5

in.) through bulkheads, frames or other vertical structural members; and

(3) Have a fixed ladder if the lower edge of a vertical opening is more than 600 mm (23.6 in.) above the deck or bottom plating.

(c) Each access trunk in the cargo area must be at least 760 mm (30 in.) in diameter.

(d) The lower edge of each access from the weather deck to gas-safe spaces in the cargo area must be at least 2.4 m (7.9 ft.) above the weather deck or the access must be through an air lock that meets § 154.345.

(e) The inner hull in the cargo area must be accessible for inspection from at least one side without the removal of any fixed structure or fitting.

(f) The hold space insulation in the cargo area must be accessible for inspection from at least one side from within the hold space or there must be a means, that is specially approved by the Commandant, of determining from outside the hold space whether or not the hold space insulation meets this part.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.345 Air locks.

(a) An air lock may be used for access from a gas-dangerous zone on the weather deck to a gas-safe space.

(b) Each air lock must:

(1) Consist of two steel doors, at least 1.5 m (4.9 ft.) but not more than 2.5 m (8.2 ft.) apart, each gasketed and tight when tested with a fire hose at not less 207 kPa gauge (30 psig);

(2) Have self-closing doors with no latches or other devices for holding them open;

(3) Have an audible and visual alarm on both sides which are actuated when both door securing devices are in other than the fully closed position at the same time;

(4) Have mechanical ventilation in the space between the doors from a gas-safe area;

(5) Have a pressure greater than that of the gas-dangerous area on the weather deck;

(6) Have the rate of air change in the space between the doors of at least 8 changes per hour; and

(7) Have the space between the doors monitored for cargo vapor leaks under § 154.1350.

(c) In addition to the requirements of paragraphs (a) and (b) of this section, no gas-safe space on a liquefied flammable gas carrier may have an air lock unless the space:

(1) Is mechanically ventilated to make the pressure in the space greater than that in the air lock; and

(2) Has a means of automatically de-energizing all electrical equipment that is not explosion-proof in the space when the pressure in the space falls to or below the pressure in the air lock.

§ 154.350 Bilge and ballast systems in the cargo area.

(a) Hold, interbarrier, and insulation spaces must have a means of sounding the space or other means of detecting liquid leakage specially approved by the Commandant (G-MTH).

(b) Each hold and insulation space must have a bilge drainage system.

(c) Interbarrier spaces must have an eductor or pump for removing liquid cargo and returning it to the cargo tanks or to an emergency jettisoning system meeting § 154.356.

(d) Spaces in the cargo containment portion of the vessel, except ballast spaces and gas-safe spaces, must not connect to pumps in the main machinery space.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.355 Bow and stern loading piping.

(a) Bow and stern loading piping must:

(1) Meet § 154.310;

(2) Be installed in an area away from the accommodation, service, or control space on type IG hulls;

(3) Be clearly marked;

(4) Be segregated from the cargo piping by a removable spool piece in the cargo area or by at least two shut-off valves in the cargo area that have means of locking to meet § 154.1870(a);

(5) Have a means for checking for cargo vapor between the two valves under paragraph (a)(4) of this section.

(6) Have fixed inert gas purging lines; and

(7) Have fixed vent lines for purging with inert gas to meet § 154.1870(b).

(b) Entrances, forced or natural ventilation intakes, exhausts, and other openings to accommodation, service, or control spaces that face the bow or stern loading area must meet § 154.330.

§ 154.356 Cargo emergency jettisoning piping.

Emergency jettisoning piping must:

(a) Meet § 154.355(a);

(b) Be designed to allow cargo discharge without the outer hull steel temperature falling below the minimum temperatures under §§ 154.170 and 154.172; and

(c) Be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

CARGO CONTAINMENT SYSTEMS

§ 154.401 Definitions.

As used in §§ 154.440 and 154.447:

"σ_Y" means the minimum yield strength of the tank material, including weld metal, at room temperature.

"σ_B" means minimum tensile strength of the tank material, including weld metals, at room temperature.

§ 154.405 Design vapor pressure (P_o) of a cargo tank.

(a) The design vapor pressure (P_o) of a cargo tank must be equal to or greater than the MARVS.

(b) The P_o of a cargo tank must be equal to or greater than the vapor pressure of the cargo at 45° C (113° F) if:

(1) The cargo tank has no temperature control for the cargo; and

(2) The vapor pressure of the cargo results solely from ambient temperature.

(c) The P_o of a cargo tank may be exceeded under harbor conditions if specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.406 Design loads for cargo tanks and fixtures: General.

(a) Calculations must show that a cargo tank and its fixtures are designed for the following loads:

(1) Internal pressure head.

(2) External pressure load.

(3) Dynamic loads resulting from the motion of the vessel.

(4) Transient or stationary thermal loads if the design temperature is colder that −55° C (−67° F) or causes thermal stresses in cargo tank supports.

(5) Sloshing loads, if the cargo tank is designed for partial loads.

(6) Loads resulting from vessel's deflection.

(7) Tank weight, cargo weight, and corresponding support reaction.

(8) Insulation weight.

(9) Loads of a pipe tower and any other attachments to the cargo tank.

(10) Vapor pressure loads in harbor conditions allowed under § 154.405.

(11) Gas pressurization if the cargo tank is designed for gas pressurization as a means of cargo transfer.

(b) A cargo tank must be designed for the most unfavorable static heel angle within a 0° to 30° range without exceeding the allowable stress of the material.

(c) A hydrostatic or hydropneumatic test design load must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.407 Cargo tank internal pressure head.

(a) For the calculation required under § 154.406(a)(1) and (b), the internal pressure head (h_{eq}), must be determined from the following formula:

$$h_{eq} = 10\ P_o + (h_{gd})_{max}$$

where:

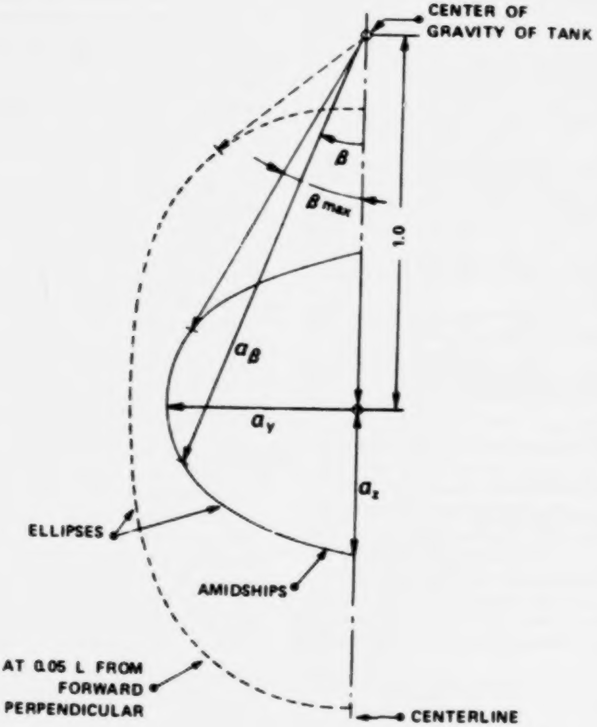
h_{gd} (the value of internal pressure, in meters of fresh water, resulting from the combined effects of gravity and dynamic accelerations of a full tank) $= a^{\beta} Z^{\beta} Y$;

where:

a^{β} = dimensionless acceleration relative to the acceleration of gravity resulting from gravitational and dynamic loads in the $^{\beta}$ direction (see figure 1);

Z^{β}=largest liquid height (m) above the point where the pressure is to be determined in the β direction (see figure 2);

Y=maximum specific weight of the cargo (t/m³) at the design temperature.

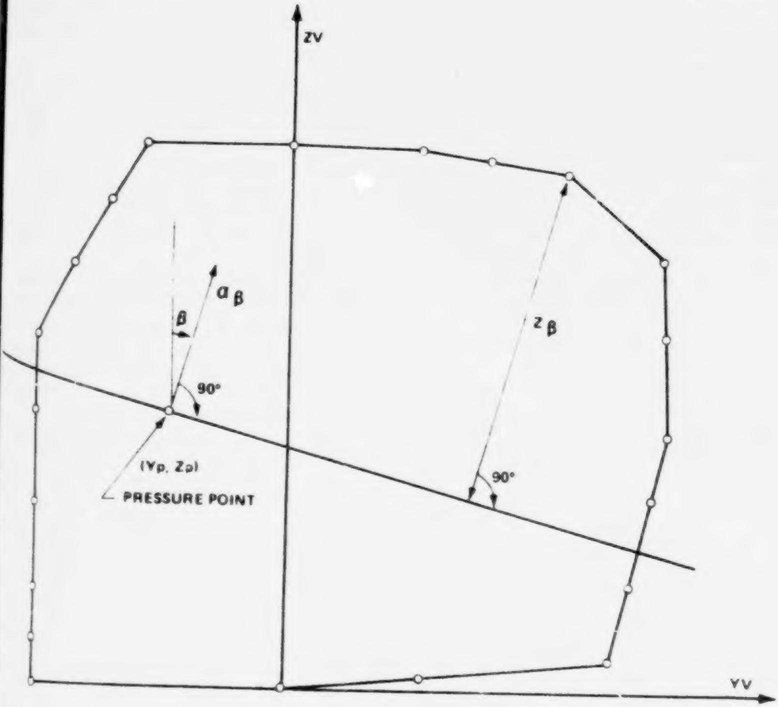

CENTER OF GRAVITY OF TANK
β
β_{max}
1.0
a_{β}
a_y
a_z
ELLIPSES
AMIDSHIPS
AT 0.05 L FROM FORWARD PERPENDICULAR
CENTERLINE

NOTE: RESULTING ACCELERATION (STATIC + DYNAMIC) = a_{β} IN ARBITRARY DIRECTION β.

a_y = TRANSVERSE COMPONENT OF ACCELERATION.

a_z = VERTICAL COMPONENT OF ACCELERATION.

Figure 1. Acceleration Ellipse



NOTE: LARGEST LIQUID HEIGHT ABOVE THE POINT WHERE THE PRESSURE IS DETERMINED = Z_β

Figure 2. Determination of Internal Pressure Heads

(b) The $(h_{gd})_{max}$ is determined for the β direction, on the ellipse in Figure 1, which gives the maximum value for h_{gd}.

(c) When the longitudinal acceleration is considered in addition to the vertical transverse acceleration, an ellipsoid must be used in the calculations instead of the ellipse contained in Figure 1.

§ 154.408 Cargo tank external pressure load.

For the calculation required under § 154.406 (a)(2) and (b), the external pressure load must be the difference between the minimum internal pressure (maximum vacuum), and the maximum external pressure to which any portion of the cargo tank may be simultaneously subjected.

§ 154.409 Dynamic loads from vessel motion.

(a) For the calculation required under § 154.406 (a)(3) and (b), the dynamic loads must be determined from the long term distribution of vessel motions, including the effects of surge, sway, heave, roll, pitch, and yaw on irregular seas that the vessel may experience during 10^8 wave encounters. The speed used for this calculation may be reduced from the ship service speed if specially approved by the Commandant (G-MTH) and if that reduced speed is used in the hull strength calculation under § 31.10-5(c) of this chapter.

(b) If the loads determined under paragraphs (c), (d), or (e) of this section result in a design stress that is lower than the allowable stress of the material under §§ 154.610, 154.615, or 154.620, the allowable stress must be reduced to that stress determined in paragraphs (c), (d), or (e).

(c) If a tank is designed to avoid plastic deformation and buckling, then acceleration components of the dynamic loads must be determined for the largest loads the vessel may experience during an operating life corresponding to the probability level of 10^{-8}, by using one of the following methods:

(1) Method 1 is a detailed analysis of the vessel's acceleration components.

(2) Method 2 applies to vessels of 50 m (164 ft) or more in length and is an analysis by the following formulae that corresponds to a 10^{-8} probability level in the North Atlantic:

(i) Vertical acceleration under paragraph (f)(1) of this section:

$$a_z = \pm a_0\sqrt{1 + \left(5.3 - \frac{45}{L_o}\right)^2\left(\frac{x}{L_o} + 0.05\right)^2\left(\frac{0.6}{C_B}\right)^{3/2}}$$

(ii) Transverse acceleration under § 154.409(f)(2):

$$a_y = \pm a_0\sqrt{0.6 + 2.5\left(\frac{x}{L_o} + 0.05\right)^2 + K\left(1 + 0.6K\frac{z}{B}\right)^2}$$

(iii) Longitudinal acceleration under § 154.409(f)(3):

$$a_x = \pm a_0\sqrt{0.06 + A^2 - 0.25A}$$

where:

$$A = \left(0.7 - \frac{L_o}{1200} + 5\frac{z}{L_o}\right)\left(\frac{0.6}{C_B}\right)$$

L_o = the distance in meters on the estimated summer loadline, from the fore side of the stem to the after side of the rudder-post or sternpost: where there is no rudderpost or sternpost, L_o is to be measured to the centerline of the rudder stock, but in any case

L_o is not to be less than 96% and need not be greater than 97% of the length on the summer loadline.

C_B = block coefficent.

B = greatest moulded breadth, in meters.

x = longitudinal distance, in meters, from amidships to the center of gravity of the tank with contents (positive - forward of amidships, negative - aft of amidships).

z = vertical distance in meters, from the vessel's waterline, to center of gravity of tank with contents (positive - above, and negative - below the waterline).

$$a_o = 0.2 \frac{V}{\sqrt{L_o}} + \frac{34-(600/L_o)}{L_o}$$

V = service speed in knots.

K = 1.0 OR $\frac{13GM}{B}$, whichever is greater.

GM = metacentric height in meters.

a_x = the maximum dimensionless acceleration in the x direction, acting separately for calculation purposes, and includes the component of the static weight in the longitudinal direction due to pitching.

a_y = maximum dimensionless acceleration in the y direction, acting separately for calculation purposes, and includes the component of static weight in the transverse direction due to rolling.

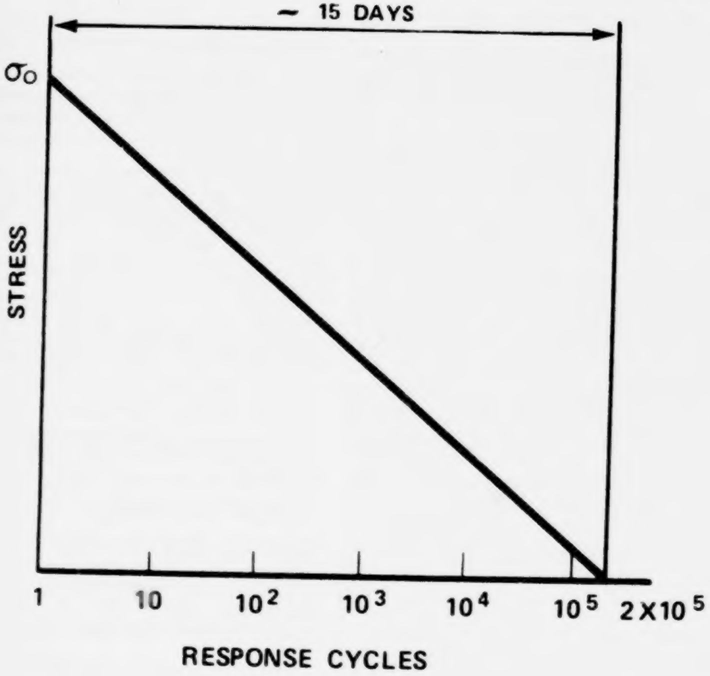
a_z = maximum dimensionless acceleration in the z direction, acting separately for calculation purposes, not including the static weight.

(d) If a cargo tank is designed to avoid fatigue, the dynamic loads determined under paragraph (a) of this section must be used to develop the dynamic spectrum.

(e) If a cargo tank is designed to avoid uncontrolled crack propagation, the dynamic loads are:

(1) Determined under paragraph (a) of this section; and

(2) For a load distribution for a period of 15 days by the method in Figure 3.



NOTE: σ_O = MOST PROBABLE MAXIMUM STRESS DURING THE LIFE OF THE VESSEL.

RESPONSE CYCLE SCALE IS LOGARITHMIC.

THE VALUE OF 2×10^5 IS GIVEN AS AN EXAMPLE OF ESTIMATE.

Figure 3. Simplified Load Distribution

(f) When determining the accelerations for dynamic loads under paragraph (a) of this section, the accelerations acting in a cargo tank must be estimated for the cargo tank's center of gravity and include the following component accelerations:

(1) Vertical accelerations, meaning the motion acceleration of heave and pitch, and of any roll normal to the vessel base that has an effect on the component acceleration.

(2) Transverse acceleration, meaning the motion acceleration of sway, yaw

and roll, and gravity component of roll.

(3) Longitudinal acceleration, meaning the motion acceleration of surge and pitch and gravity component of pitch.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.410 Cargo tank sloshing loads.

(a) For the calculation required under § 154.406 (a)(5) and (b), the determined sloshing loads resulting from the accelerations under § 154.409(f) must be specially approved by the Commandant (G-MTH).

(b) If the sloshing loads affect the cargo tank scantlings, an analysis of the effects of the sloshing loads in addition to the calculation under paragraph (a) of this section must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.411 Cargo tank thermal loads.

For the calculations required under § 154.406(a)(4), the following determined loads must be specially approved by the Commandant (G-MTH):

(a) Transient thermal loads for the cooling down periods of cargo tanks for design temperatures lower than −55° C (−67° F).

(b) Stationary thermal loads for cargo tanks for design temperatures lower than −55° C (−67° F) that cause high thermal stress.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.412 Cargo tank corrosion allowance.

A cargo tank must be designed with a corrosion allowance if the cargo tank:

(a) is located in a space that does not have inert gas or dry air; or

(b) carries a cargo that corrodes the tank material.

NOTE: Corrosion allowance for independent tank type C is contained in § 54.01-35 of this chapter.

INTEGRAL TANKS

§ 154.418 General.

An integral tank must not be designed for a temperature colder than −10° C (14° F), unless the tank is specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.419 Design vapor pressure.

The P_o of an integral tank must not exceed 24.5 kPa gauge (3.55 psig) unless special approval by the Commandant (G-MTH) allows a P_o between 24.5 kPa gauge (3.55 psig) and 69 kPa gauge (10 psig).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.420 Tank design.

(a) The structure of an integral tank must meet the deep tank scantling standards of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981.

(b) The structure of an integral tank must be designed and shown by calculation to withstand the internal pressure determined under § 154.407.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.421 Allowable stress.

The allowable stress for the integral tank structure must meet the American Bureau of Shipping's allowable stress for the vessel's hull published in "Rules for Building and Classing Steel Vessels", 1981.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

MEMBRANE TANKS

§ 154.425 General.

The design of the hull structure and the design of the membrane tank system, that includes the membrane tank, secondary barrier, including welds, the supporting insulation, and pressure control equipment, must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.426 Design vapor pressure.

The P_o of a membrane tank must not exceed 24.5 kPa gauge (3.55 psig) unless special approval by the Commandant (G-MTH) allows a P_o between 24.5 kPa gauge (3.55 psig) and 69 kPa gauge (10 psig).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.427 Membrane tank system design.

A membrane tank system must be designed for:

(a) Any static and dynamic loads with respect to plastic deformation and fatigue;

(b) Combined strains from static, dynamic, and thermal loads;

(c) Preventing collapse of the membrane from:

(1) Over-pressure in the interbarrier space;

(2) Vacuum in the cargo tank;

(3) Sloshing in a partially filled cargo tank; and

(4) Hull vibrations; and

(d) The deflections of the vessel's hull.

§ 154.428 Allowable stress.

The membrane tank and the supporting insulation must have allowable stresses that are specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.429 Calculations.

The tank design load calculations for a membrane tank must include the following:

(a) Plastic deformation and fatigue life resulting from static and dynamic loads in the membrane and the supporting insulation.

(b) The response of the membrane and its supporting insulation to vessel motion and acceleration under the worst weather conditions. Calculations from a similar vessel may be submitted to meet this paragraph.

(c) The combined strains from static, dynamic, and thermal loads.

§ 154.430 Material test.

(a) The membrane and the membrane supporting insulation must be made of materials that withstand the combined strains calculated under § 154.429(c).

(b) Analyzed data of a material test for the membrane and the membrane supporting insulation must be submitted to the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.431 Model test.

(a) The primary and secondary barrier of a membrane tank, including the corners and joints, must withstand the combined strains from static, dynamic, and thermal loads calculated under § 154.429(c).

(b) Analyzed data of a model test for the primary and secondary barrier of the membrane tank must be submitted to the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.432 Expansion and contraction.

The support system of a membrane tank must allow for thermal and physical expansion and contraction of the tank.

SEMI-MEMBRANE TANKS

§ 154.435 General.

(a) The design of a semi-membrane tank, the supporting insulation for the tank, and the supporting hull structure for the tank must be specially approved by the Commandant (G-MTH).

(b) A semi-membrane tank must be designed to meet:

(1) § 154.425 through § 154.432;

(2) § 154.437 through § 154.440; or

(3) § 154.444 through § 154.449.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.436 Design vapor pressure.

The P_o of a semi-membrane tank must not exceed 24.5 kPa gauge (3.55 psig) unless special approval by the Commandant (G-MTH) allows a P_o between 24.5 kPa gauge (3.55 psig) and 69 kPa gauge (10 psig).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

INDEPENDENT TANK TYPE A

§ 154.437 General.

An independent tank type A must meet § 154.438 through § 154.440.

§ 154.438 Design vapor pressure.

(a) If the surface of an independent tank type A are mostly flat surfaces,the P_o must not exceeed 69 kPa gauge (10 psig).

(b) If the surfaces of an independent tank type A are formed by bodies of revolution, the design calculation of the P_o must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.439 Tank design.

An independent tank type A must meet the deep tank standard of the American Bureau of Shipping published in "Rules for Building and Classing Steel Vessels", 1981, and must:

(a) Withstand the internal pressure determined under § 154.407;

(b) Withstand loads from tank supports calculated under §§ 154.470 and 154.471; and

(c) Have a corrosion allowance that meets § 154.412.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.440 Allowable stress.

(a) The allowable stresses for an independent tank type A must:

(1) For tank web frames, stringers, or girders of carbon maganese steel or aluminum alloys, meet $\sigma_B/2.66$ or $\sigma_Y/1.33$, whichever is less; and

(2) For other materials, be specially approved by the Commandant (G-MTH).

(b) A greater allowable stress than required in paragraph (a)(1) of this section may be specially approved by the Commandant (G-MTH) if the equivalent stress (σ_c) is calculated from the formula in Appendix A of this part.

(c) Tank plating must meet the American Bureau of Shipping's deep tank standards, for an internal pressure head that meets § 154.439(a), published in "Rules for Building and Classing Steel Vessels", 1981.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983; CGD 77-069, 52 FR 31630, Aug. 21, 1987]

INDEPENDENT TANK TYPE B

§ 154.444 General.

An independent tank type B must be designed to meet §§ 154.445 through 154.449.

§ 154.445 Design vapor pressure.

If the surfaces of an independent tank type B are mostly flat surfaces, the P_o must not exceed 69 kPa gauge (10 psig).

§ 154.446 Tank design.

An independent tank type B must meet the calculations under § 154.448.

§ 154.447 Allowable stress.

(a) An independent tank type B designed from bodies of revolution must have allowable stresses[3] determined by the following formulae:

$\sigma_m < f$

$\sigma_L < 1.5\ f$

$\sigma_b < 1.5\ F$

$\sigma_L + \sigma_b < 1.5\ F$

$\sigma_m + \sigma_b < 1.5\ F$

where:

σ_m=equivalent primary general membrane stress[4]

σ_L=equivalent primary local membrane stress[4]

σ_b=equivalent primary bending stress[4]

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[3] See Appendix B for stress analyses definitions.

[4] See Appendix A for equivalent stress.

f=the lesser of (σ_B/A) or (σ_Y/B)
F=the lesser of (σ_B/C) or (σ_Y/D)
A, B, C, and D=stress factors in Table 2.

TABLE 2—VALUES FOR STRESS FACTORS

	Nickel steel and carbon manganese steel values	Austenitic steel values	Aluminum alloy values
Stress factors:			
A	4.0	4.0	4.0
B	2.0	1.6	1.5
C	3.0	3.0	3.0
D	1.5	1.5	1.5

(b) An independent tank type B designed from plane surfaces must have allowable stresses specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.448 Calculations.

The following calculations for an independent tank type B must be specially approved by the Commandant (G-MTH):

(a) Plastic deformation, fatigue life, buckling, and crack propagation resulting from static and dynamic loads on the tank and its support.

(b) A three-dimensional analysis of the stress exerted by the hull on the tank, its its support, and its keys.

(c) The response of the tank and its support to the vessel's motion and acceleration in irregular waves or caculations from a similar vessel.

(d) A tank buckling analysis considering the maximum construction tolerance.

(e) A finite element analysis using the loads determined under § 154.406.

(f) A fracture mechanics analysis using the loads determined under § 154.406.

(g) The cumulative effects of the fatigue load from the following formula.

$$\sum \frac{n_i}{N_i} + \frac{10^3}{N_j} \le C_w$$

where:

n_i=the number of stress cycles at each stress level during the life of the vessel;
N_i=the number of cycles to failure for corresponding stress levels from the Wohler (S-N) curve;
N_j=the number of cycles to failure from the fatigue load by loading and unloading the tank; and
C_w=0.5 or less. A C_w of greater than 0.5 but not exceeding 1.0 may be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.449 Model test.

The following analyzed data of a model test of structural elements for independent tank type B must be submitted to the Commandant (G-MTH) for special approval:

(a) Stress concentration factors.

(b) Fatigue life.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

INDEPENDENT TANK TYPE C AND PROCESS PRESSURE VESSELS

§ 154.450 General.

Independent tanks type C and process pressure vessels must be designed to meet the requirements under Part 54 of this chapter, except § 54.01-40(b), and:

(a) The calculation under § 54.01-18 (b)(1) must also include the design loads determined under § 154.406;

(b) The calculated tank plating thickness, including any corrosion allowance, must be the minimum thickness without a negative plate tolerance; and

(c) The minimum tank plating thickness must not be less than:

(1) 5mm (3/16 in.) for carbon-manganese steel and nickel steel;

(2) 3mm (1/8 in.) for austenitic steels; or

(3) 7mm (9/32 in.) for aluminum alloys.

§ 154.451 Design vapor pressure.

The P_o (kPa) of an independent tank type C must be calculated by the following formula:

$$P_o = 196 + AC(\rho)^{3/2}$$

where:

$A = 1.813\ (\sigma_m/\Delta\sigma_A)^2$;

σ_m = design primary membrane stress;

$\Delta\sigma_A$ = (allowable dynamic membrane stress for double amplitude at probability level $Q = 10^{-8}$) 53.9 MPa (7821 psi) for ferritic and martensitic steels and 24.5 MPa (3555 psi) for 5083-0 aluminum;

C = a characteristic tank dimension that is the greatest of h, 0.75b, or 0.45 l;

where:

h = the height of the tank or the dimension in the vessel's vertical direction, in meters;

b = the width of the tank or the dimension in the vessel's transverse direction; in meters; and

l = the length of the tank or the dimension in the vessel's longitudinal direction, in meters; and

ρ = the specific gravity of the cargo.

§ 154.452 External pressure.

The design external pressure, P_e, for an independent tank type C must be calculated by the following formula:

$$P_e = P_1 + P_2 + P_3 + P_4$$

where:

P_1 = the vacuum relief valve setting for tanks with a vacuum relief valve, or 24.5 kPa guage (3.55 psig) for tanks without a vacuum relief valve.

P_2 = 0, or the pressure relief valve setting for an enclosed space containing any portion of a pressure vessel.

P_3 = total compressive load in the tank shell from the weight of the tank, including corrosion allowance, weight of insulation, weight of dome, weight of pipe tower and piping, the effect of the partially filled tank, the effect of acceleration and hull deflection, and the local effect of external and internal pressure.

P_4 = 0, or the external pressure from the head of water from any portion of the pressure vessel on exposed decks.

§ 154.453 Failure to meet independent tank type C standards.

If the Commandant (G-MTH) determines during plan review, that a tank designed as an independent tank type C fails to meet the standards under § 154.450, § 154.451, and 154.452 and can not be redesigned to meet those standards, the tank may be redesigned as an independent tank type A or B.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

SECONDARY BARRIER

§ 154.459 General.

(a) Each cargo tank must have a secondary barrier that meets Table 3 and except as allowed in Table 3, the hull must not be the secondary barrier.

(b) If the Commandant (G-MTH) specially approves an integral tank for a design temperature at atmospheric pressure lower than −10° C (14° F), the integral tank must have a complete secondary barrier that meets § 154.460.

(c) If the Commandant (G-MTH) specially approves a semi-membrane tank under the requirements of an independent tank type B, the semi-membrane tank may have a partial secondary barrier specially approved by the Commandant (G-MTH).

(d) If Table 3 allows the hull to be a secondary barrier, the vessel's hull must:

(1) Meet §§ 154.605 through 154.630; and

(2) Be designed for the stresses resulting from the design temperature.

TABLE 3—SECONDARY BARRIERS FOR TANKS

Tank type	Cargo temperature (T) at atmospheric pressure		
	T>−10°C (14°F)	T<−10°C (14°F)>55°C (−67°F)	T<−55°C (−67°F)
Integral	No secondary barrier required	Tank type not usually allowed [1]	Tank type not allowed.
Membrane	do	Complete secondary barrier [1]	Complete secondary barrier.
Semi-membrane	do	do	Do.
Independent:			
Type A	do	do	Do.
Type B	do	Partial secondary barrier [1]	Partial secondary barrier.
Type C	do	No secondary barrier required	No secondary barrier required

[1] The hull may be a secondary barrier.

(14 U.S.C. 632; 46 U.S.C. 369, 375, and 416; 49 U.S.C. 1655(b); 49 CFR 1.46(b))

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.460 Design criteria.

At static angles of heel up through 30°, a secondary barrier must

(a) If a complete secondary barrier is required in § 154.459, hold all of the liquid cargo in the cargo tank for at least 15 days under the dynamic loads in § 154.409(e);

(b) If a partial secondary barrier is permitted in § 154.459, hold any leakage of liquid cargo corresponding to the extent of failure under § 154.448(a) after initial detection or primary barrier leak for at least 15 days under the dynamic loads in § 154.409(e);

(c) If the primary barrier fails, prevent the temperature of the vessel's structure from falling below the minimum allowable service temperature of the steel; and

(d) Be designed so that a cargo tank failure does not cause a failure in the secondary barrier.

INSULATION

§ 154.465 General.

If the design temperature is below −10° C (14° F), the cargo tank insulation must prevent the temperature of the vessel's hull from cooling below the minimum temperature allowed under § 154.172.

§ 154.466 Design criteria.

(a) The insulation for a cargo tank without a secondary barrier must be designed for the cargo tank at the design temperature, and for a vessel operating in:

(1) Any waters in the world, except Alaskan waters, for the ambient cold condition of:

(i) Five knots air at −18° C (0° F); and

(ii) Still sea water at 0° C (32° F); or

(2) Alaskan waters for the ambient cold condition of:

(i) Five knots air at −29° C (20° F); and

(ii) Still sea water at −2° C (28° F).

(b) The insulation for a cargo tank with a secondary barrier must be designed for the secondary barrier at the design temperature, and the ambient cold conditions listed under paragraph (a)(1) or paragraph (a)(2) of this section.

(c) The insulation material must be designed for any loads transmitted from adjacent hull structure.

(d) Insulation for cargo tank and piping must meet § 38.05-20 of this chapter.

(e) Powder or granulated insulation must:

(1) Not compact from vibrations of the vessel;

(2) Maintain the thermal conductivity listed under § 154.467; and

(3) Not exert a static pressure greater than the external design pressure of the cargo tank under § 154.408.

§ 154.467 Submission of insulation information.

The following insulation information must be submitted for special approval by the Commandant (G-MTH):

(a) Compatibility with the cargo.

(b) Solubility in the cargo.

(c) Absorption of the cargo.

(d) Shrinkage.

(e) Aging.

(f) Closed cell content.

(g) Density.

(h) Mechanical properties.

(i) Thermal expansion.

(j) Abrasion.

(k) Cohesion.

(l) Thermal conductivity.

(m) Resistance to vibrations.

(n) Resistance to fire and flame spread.

(o) The manufacturing and installation details of the insulation including:

(1) Fabrication;

(2) Storage;

(3) Handling;

(4) Erection; and

(5) Quality control.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

SUPPORT SYSTEM

§ 154.470 General.

(a) A cargo tank must have a support system that:

(1) prevents movement of the cargo tank under the static and dynamic loads in § 154.406; and

(2) allows the cargo tank to contract and expand from temperature variation and hull deflection without exceeding the design stress of the cargo tank and the hull.

(b) The cargo tank support system must have a key that prevents rotation of the cargo tank.

(c) An independent tank must have supports with an antiflotation system that withstands the upward force of the tank without causing plastic deformation that endangers the hull structure when the tank is:

(1) Empty; and

(2) In a hold space flooded to the summer load draft of the vessel.

§ 154.471 Design criteria.

(a) The cargo tank support system must be designed:

(1) For the loads in § 154.406(a);

(2) To not exceed the allowable stress under this part at a static angle of heel of 30°;

(3) To withstand a collision force equal to at least one-half the weight of the cargo tank and cargo from forward and one-quarter the weight of the cargo tank and cargo from aft; and

(4) For the largest resulting acceleration in Figure 1, including rotational and translation effects.

(b) The cargo tank support design loads in paragraph (a) of this section may be analyzed separately.

§ 154.476 Cargo transfer devices and means.

(a) If a cargo pump in a cargo tank is not accessible for repair when the cargo tank is in use, the cargo tank must have an additional means of cargo transfer, such as another pump or gas pressurization.

(b) If cargo is transferred by gas pressurization, the pressurizing line must have a safety relief valve that is set at less than 90 percent of the tank relief valve setting.

CARGO AND PROCESS PIPING SYSTEMS

§ 154.500 Cargo and process piping standards.

The cargo liquid and vapor piping and process piping systems must meet the requirements in §§ 154.503 through 154.562, Subparts 56.01 through 56.35, §§ 56.50-20 and 56.50-105, and Subparts 56.60 through 56.97 of this chapter.

§ 154.503 Piping and piping system components: Protection from movement.

Where thermal movement and movements of the cargo tank and the hull structure may cause stresses that exceed the design stresses, the piping and piping system components and cargo tanks must be protected from movement by:

(a) Offsets;

(b) Loops;

(c) Bends;

(d) Mechanical expansion joints including:

(1) Bellows;

(2) Slip joints;

(3) Ball joints; or

(e) Other means specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.506 Mechanical expansion joint: Limits in a piping system.

Mechanical expansion joints in a piping system outside of a cargo tank:

(a) May be installed only if offsets, loops or bends cannot be installed due to limited space or piping arrangement;

(b) Must be a bellows type; and

(c) Must not have insulation or a cover unless necessary to prevent damage.

§ 154.512 Piping: Thermal isolation.

Low temperature piping must be thermally isolated from any adjacent hull structure to prevent the temperature of that structure from dropping below the minimum temperature for the hull material under § 154.170.

§ 154.514 Piping: Electrical bonding.

(a) Cargo tanks or piping that are separated from the hull structure by thermal isolation must be electrically bonded to the hull structure by a method under paragraph (c) of this section.

(b) A pipe joint or a hose connection fitting that has a gasket must be electrically bonded by a method under paragraph (c) of this section that bonds:

(1) Both sides of the connection to the hull structure; or

(2) Each side of the connection to the other side.

(c) An electrical bond must be made by at least one of the following methods:

(1) A metal bonding strap attached by welding or bolting.

(2) Two or more bolts that give metal to metal contact between the bolts and the parts to be bonded.

(3) Metal to metal contact between adjacent parts under designed operating conditions.

§ 154.516 Piping: Hull protection.

A vessel's hull must be protected from low temperature liquid leakage by a drip pan, or other means specially approved by the Commandant (G-MTH), at:

(a) Each piping connection dismantled on a routine basis;

(b) Cargo discharge and loading manifolds; and

(c) Pump seals.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.517 Piping: Liquid pressure relief.

The cargo loading and discharge crossover headers, cargo hoses, and cargo loading arms must have means to relieve cargo pressure and to remove liquid cargo.

§ 154.519 Piping relief valves.

(a) The liquid relief valve that protects the cargo piping system from liquid pressure exceeding the design pressure must discharge into:

(1) A cargo tank; or

(2) A cargo vent mast if that vent mast has a means for the detection and removal of the liquid cargo that is specially approved by the Commandant (G-MTH).

(b) A relief valve on a cargo pump that protects the cargo piping system must discharge into the pump suction.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.520 Piping calculations.

A piping system must be designed to meet the allowable stress values under § 56.07-10 of this chapter and, if the design temperature is −110° C (−166° F) or lower, the stress analysis must be specially approved by the Commandant (G-MTH) and must include:

(a) Pipe weight loads;

(b) Acceleration loads;

(c) Internal pressure loads;

(d) Thermal loads; and

(e) Loads from the hull.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.522 Materials for piping.

(a) The materials for piping systems must meet § 154.625 for the minimum design temperature of the piping, except the material for open ended vent piping may be specially approved by the Commandant (G-MTH) if:

(1) The temperature of the cargo at the pressure relief valve setting is −55° C (−67° F) or warmer; and

(2) Liquid can not discharge to the vent piping.

(b) Materials for piping outside the cargo tanks must have a melting point of at least 925° C (1697° F), except for short lengths of pipes with fire resisting insulation that are attached to the cargo tanks.

§ 154.524 Piping joints: Welded and screwed couplings.

Pipe lengths without flanges must be joined by one of the following:

(a) A butt welded joint with complete penetration at the weld root except that for design temperatures colder than −10° C (14° F) the butt weld must be double welded or must be welded using:

(1) A backing ring that for design pressures greater than 979 kPa gauge (142 psig) must be removed after the weld is completed;

(2) A consumable insert; or

(3) An inert gas back-up on the first weld pass.

(b) A slip-on welded joint with sleeves and attachment welds is allowed for an open ended pipe with an external diameter of 50 mm (2 in.) or less and a design temperature of −55° C (−67° F), or warmer.

(c) A socket weld fitting with attachment welds is allowed for pipe with an external diameter of 50 mm (2 in.) or less and a design temperature of −55° C (−67° F) or warmer.

(d) Screwed couplings are allowed for instrumentation and control piping that meets § 56.30-20 and § 56.50-105 (a)(4) and (b)(4) of this chapter.

(e) A method or fitting specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.526 Piping joints: Flange connection.

Flange connections for pipe joints must meet § 56.30-10 and § 56.50-105 (a)(4) and (b)(4) of this chapter.

§ 154.528 Piping joints: Flange type.

(a) A flange must be one of the following types:

(1) Welding neck.

(2) Slip-on.

(3) Socket weld.

(b) If the piping is designed for a temperature between −10° C (14° F) and −55° C (−67° F), the pipe flange may be a:

(1) Slip-on type, if the nominal pipe size is 100 mm (4 in.) or less;

(2) Socket weld, if the nominal pipe size is 50 mm (2 in.) or less; or

(3) Welding neck.

(c) If the piping is designed for a temperature lower than −55° C (−67° F), the pipe flange must be a welding neck type.

§ 154.530 Valves: Cargo tank MARVS 69 kPa gauge (10 psig) or lower.

(a) Except those connections for tank safety relief valves and for liquid level gauging devices other than those under §§ 154.536 and 154.1310, liquid and vapor connections on a cargo tank with a MARVS of 69 kPa gauge (10 psig) or lower must have shut-off valves that—

(1) Are located as close to the tank as practical;

(2) Are capable of local manual operation; and

(3) May be remotely controlled.

(b) The cargo piping system for a cargo tank with a MARVS of 69 kPa gauge (10 psig) or lower must have at least one remotely controlled quick-closing shut-off valve for closing liquid and vapor piping between vessel and shore that meets §§ 154.540 and 154.544.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.532 Valves: Cargo tank MARVS greater than 69 kPa gauge (10 psig).

(a) Except connections for tank safety relief valves and except for liquid level gauging devices other than those under §§ 154.536 and 154.1310, liquid and vapor connections on a cargo tank with a MARVS greater than 69 kPa gauge (10 psig) must have, as close to the tank as practical, a:

(1) Stop valve capable of local manual operation; and

(2) A remotely controlled quick-closing shut-off valve.

(b) If the nominal pipe size of a liquid or vapor connection is less than 50 mm (2 in.), an excess flow valve may be substituted for the quick-closing valve under paragraph (a) of this section.

(c) One valve may be substituted for the manual controlled stop valve and the remotely controlled quick-closing shut-off valve required under paragraph (a) of this section if that valve:

(1) Meets §§ 154.540 and 154.544; and

(2) Is capable of local manual operation.

§ 154.534 Cargo pumps and cargo compressors.

Cargo pumps and cargo compressors must shut-down automatically when the quick-closing shut-off valves under §§ 154.530 and 154.532 are closed by the emergency shut-down system required under § 154.540.

§ 154.536 Cargo tank gauging and measuring connections.

Unless the outward flow from a cargo tank is less than the flow through a circular hole of 1.4 mm (0.055 in.) in diameter, cargo tank connections for gauging or measuring devices must have the excess flow, shut-off, or quick-closing shut-off valves under § 154.530 or § 154.532.

§ 154.538 Cargo transfer connection.

A cargo transfer connection must have a:

(a) Remotely controlled quick-closing shut-off valve that meets §§ 154.540 and 154.544; or

(b) Blank flange.

§ 154.540 Quick-closing shut-off valves: Emergency shut-down system.

The quick-closing shut-off valves under §§ 154.530, 154.532, and 154.538 must have an emergency shut-down system that:

(a) Closes all the valves;

(b) Is actuated by a single control in at least two locations remote from the quick-closing valves;

(c) Is actuated by a single control in each cargo control station under § 154.320; and

(d) Has fusible elements at each tank dome and cargo loading and discharge manifold that melt between 98° C (208° F) and 104° C (220° F) and actuate the emergency shut-down system.

§ 154.544 Quick-closing shut-off valves.

The quick-closing shut-off valve under §§ 154.530, 154.532 and 154.538 must:

(a) Be a shut-off valve;

(b) Close from the time of actuation in 30 seconds or less;

(c) Be the fail-closed type; and

(d) Be capable of local manual closing.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987]

§ 154.546 Excess flow valve: Closing flow.

(a) The rated closing flow of vapor or liquid cargo for an excess flow valve must be specially approved by the Commandant (G-MTH).

(b) An excess flow valve allowed under § 154.532(b) must close automatically at the rated closing flow.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.548 Cargo piping: Flow capacity.

Piping with an excess flow valve must have a vapor or liquid flow capacity that is greater than the rated closing flow under § 154.546.

§ 154.550 Excess flow valve: Bypass.

If the excess flow valve allowed under § 154.532(b) has a bypass, the bypass must be of 1.0 mm (0.0394 in.) or less in diameter.

CARGO HOSE

§ 154.551 Cargo hose: General.

Each of the vessel's liquid and vapor cargo hose for loading or discharging cargo must meet §§ 154.552 through 154.562.

§ 154.552 Cargo hose: Compatibility.

Liquid and vapor cargo hoses must:

(a) Not chemically react with the cargo; and

(b) Withstand design temperature.

§ 154.554 Cargo hose: Bursting pressure.

Cargo hose that may be exposed to the pressure in the cargo tank, the cargo pump discharge, or the vapor compressor discharge must have a bursting pressure of at least five times the maximum working pressure on the hose during cargo transfer.

§ 154.556 Cargo hose: Maximum working pressure.

A cargo hose must have a maximum working pressure not less than the maximum pressure to which it may be subjected and at least 1034 kPa gauge (150 psig).

§ 154.558 Cargo hose: Marking.

Each cargo hose must be marked with the:

(a) Maximum working pressure; and

(b) Minimum service temperature for service at other than ambient temperature.

§ 154.560 Cargo hose: Prototype test.

(a) Each cargo hose must be of a type that passes a prototype test at a pressure of at least five times its maximum working pressure at or below the minimum service temperature.

(b) Each cargo hose must not be the hose used in the prototype test.

§ 154.562 Cargo hose: Hydrostatic test.

Each cargo hose must pass a hydrostatic pressure test at ambient temperature of at least one and a half times its specified maximum working pressure but not more than two-fifths its bursting pressure.

MATERIALS

§ 154.605 Toughness test.

(a) Each toughness test under §§ 154.610 through 154.625 must meet Subpart 54.05 of this chapter.

(b) If subsize test specimens are used for the Charpy V-notch toughness test, the Charpy V-notch energy must meet Table 54.05-20 (a) of this chapter.

§ 154.610 Design temperature not colder than 0° C (32° F).

Materials for cargo tanks for a design temperature not colder than 0° C (32° F) must meet the following:

(a) The tank materials must meet §§ 54.25-1 and 54.25-3 of this chapter.

(b) Plates, forgings, rolled and forged bars and shapes must be carbon manganese steel or other material allowed under §§ 154.615, 154.620, and 154.625.

(c) Plates must be normalized or quenched and tempered and where the thickness exceeds 20 mm (0.787 in.), made with fine grain practice, austenitic grain size of five or finer. A control rolling procedure may be substituted for normalizing if specially approved by the Commandant (G-MTH). Plate for an independent tank type C must also meet the requirements of ASTM A-20-75 and § 54.01-18(b)(5) of this chapter.

(d) For integral and independent type A tanks, the American Bureau of Shipping's grade D not exceeding 20 mm (0.787 in.) in thickness, and Grade E hull structural steel are allowed if the steel meets § 54.05-10 of this chapter.

(e) The tensile properties under paragraph (a) of this section must be determined for:

(1) Each plate as rolled; and

(2) Each five short ton batch of forgings, forged or rolled fittings, and forged or rolled bars and shapes.

(f) The specified yield strength must not exceed 637 MPa (92.43 Ksi) and when it exceeds 490 MPa (71.10 Ksi), the hardness of the weld and the heat affected zone must be specially approved by the Commandant (G-MTH).

(g) The Charpy V-notch impact energy must be determined for:

(1) Each plate as rolled; and

(2) Each five short ton batch of forgings, forged or rolled fittings and rolled or forged bars and shapes.

(h) The orientation and required impact energy of a 10 mm x 10 mm (0.394 in. x 0.394 in.) Charpy V-notch specimen must be:

(1) For plates; transverse specimen and 27.4 J (20 ft-lbs); and

(2) For forgings, forged and rolled fittings and rolled and forged bars: longitudinal specimen and 41.1 J (30 ft-lbs).

(i) The test temperature of the Charpy V-notch specimens is as follows:

Material Thickness	Test Temperature
$t \leq 20$ mm (0.788 in.)	0° C (32° F)
$20 < t \leq 30$ mm (1.182 in.)	−20° C (−4° F)
$30 < t \leq 40$ mm (1.576 in.)	−40° C (−40° F)

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.615 Design temperature below 0° C (32° F) and down to −55° C (−67° F).

Plates, forgings, forged or rolled or forged bars and shapes for cargo tanks and secondary barriers for a design temperature below 0° C (32° F) and down to −55° C (−67° F) must meet § 54.25-10 of this chapter.

§154.620 Design temperature below −55° C (−67° F) and down to −165° C (−265° F).

Plates, forgings and forged or rolled fittings, and rolled, forged or extruded bars and shapes for cargo tanks, secondary barriers, and process pressure vessels for a design temperature below −55° C (−67° F) and down to −165° C (−265° F) must:

(a) Meet § 54.25–10(b)(2), § 54.25–15, or § 54.25–20 of this chapter; or

(b) Be of an aluminum alloy that is specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§154.625 Design temperature below 0° C (32° F) and down to −165° C (−265° F).

Pipes, tubes, forgings, castings, bolting, and nuts for cargo and process piping for a design temperature below 0° C (32° F) and down to −165° C (−265° F) must meet § 56.50–105 of this chapter.

§154.630 Cargo tank material.

(a) If a material of a cargo tank is not listed in §§ 154.610, 154.615 or §154.620, the allowable stress of that material must be specially approved by the Commandant (G-MTH).

(b) For cargo tanks of aluminum alloys with welded connections, the minimum tensile strength (σ_u) for the calculations under § 154.440, § 154.447 and § 154.450 must be the minimum tensile strength of the alloy in the annealed condition.

(c) Increased yield strength and tensile strength of a material at low temperature for independent tanks type A, B, and C must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

CONSTRUCTION

§154.650 Cargo tank and process pressure vessel welding.

(a) Cargo tank and process pressure vessel welding must meet Subpart 54.05 and Part 57 of this chapter.

(b) Welding consumables used in welding cargo tanks must meet § 57.02-4 of this chapter.

(c) Independent tanks must meet the following:

(1) Each welded joint of the shells must be a full penetration butt weld, except dome to shell connections may have full penetration tee welds.

(2) Each nozzle weld must be of the full penetration type, except for small penetrations on domes.

(d) Each welded joint in an independent tank type C or in a process pressure vessel must meet Part 54 of this chapter, except that any backing rings must be removed unless specially approved by the Commandant (G-MTH).

(e) Each welded joint in a membrane tank must meet the quality assurance measures, weld procedure qualification, design details, materials, construction, inspection, and production testing of components developed during the prototype testing program that are specially approved by the Commandant (G-MTH) under this part.

(f) Each welded joint in a semi-membrane tank must meet paragraph (c) or (e) of this section.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.655 Stress relief for independent tanks type C.

For a design temperature colder than −10° C (14° F), an independent tank type C of:

(a) Carbon and carbon-manganese steel must be stress relieved by post-weld heat treatment under § 54.25-7 of this chapter or by mechanical stress relief under Subpart 54.30 of this chapter; or

(b) Materials other than carbon and carbon manganese steel must be stress relieved as required under Part 54 of this chapter. The procedure for stress relieving must be specially approved by the Commandant (G-MTH).

§ 154.660 Pipe welding.

(a) Pipe welding must meet Part 57 of this chapter.

(b) Longitudinal butt welds, in piping that does not meet a standard or specification under § 56.60-1 of this chapter, and girth butt welds must meet the following:

(1) Butt welds of pipes made from carbon, carbon manganese, or low alloy steels must meet § 56.50-105 of this chapter, including the requirements for post-weld heat treatment.

(2) Except for piping inside an independent cargo tank type A, B, or C, butt welds must be 100% radiographically tested if the design temperature is lower than −10° C (14° F), and:

(i) The wall thickness is greater than 10 mm (0.394 in.); or

(ii) The nominal pipe diameter is greater than 100 mm (nominal 4 in.).

(3) If Table 4 references this section, butt welds for deck cargo piping exceeding 75 mm (3 in.) in diameter must be 100% radiographically tested.

(4) Butt welds of pipes not meeting paragraph (b)(2) or (b)(3) of this section must meet the non-destructive testing requirements under Subpart 56.95 of this chapter.

§ 154.665 Welding procedures.

Welding procedure tests for cargo tanks for a design temperature colder than 0° C (32° F), process pressure vessels, and piping must meet § 54.05-15 and Subpart 57.03 of this chapter.

CARGO PRESSURE AND TEMPERATURE CONTROL

§ 154.701 Cargo pressure and temperature control: General.

Except as allowed under § 154.703, cargo tanks must:

(a) Have their safety relief valves set at a pressure equal to or greater than the vapor pressure of the cargo at 45° C (113° F) but not greater than the MARVS under § 154.405; or

(b) Be refrigerated by a system meeting § 154.702, and each refrigerated incompatible cargo refrigerated by a separate system.

§ 154.702 Refrigerated carriage.

(a) Each refrigeration system must:

(1) Have enough capacity to maintain the cargo vapor pressure in each cargo tank served by the system below the set pressure of the relief valves under ambient temperatures of 45° C (113° F) still air and 32° C (89.6° F) still water with the largest unit in the system inoperative; or

(2) Have a standby unit with a capacity at least equal to the capacity of the largest refrigeration unit in the system.

(b) For the purpose of this section, a "refrigeration unit" includes a compressor and its motors and controls.

(c) Each refrigeration system must:

(1) Have a heat exchanger with an excess capacity of 25 percent of the required capacity, or

(2) A standby heat exchanger.

(d) Where cooling water is used in a refrigeration system:

(1) The cooling water pump or pumps must be used exclusively for the system;

(2) Each pump must have suction lines from sea chests on the port and starboard sides of the vessel; and

(3) There must be a standby pump, that may be used for:

(i) Non-essential purposes on the vessel; or

(ii) Essential purposes on the vessel, if the pump is sized to simultaneously provide for the capacity requirements for the essential purposes and the refrigeration cooling water.

(e) Each refrigeration system must use refrigerants that are compatible with the cargo and, for cascade units, with each other.

(f) The pressure of the heat transfer fluid in each cooling coil in a tank must be greater than the pressure of the cargo.

§ 154.703 Methane (LNG).

Unless a cargo tank carrying methane (LNG) can withstand the pressure build up due to boil-off for 21 days, the pressure in the cargo tank must be maintained below the set pressure of the safety relief valve for at least 21 days by:

(a) A refrigeration system that meets § 154.702;

(b) A waste heat or catalytic furnace that burns boil-off gas, and:

(1) Maintains the stack exhaust temperature below 535°C (995°F);

(2) Exhibits no visible flame; and

(3) Is specially approved by the Commandant (G-MTH);

(c) Boilers, inert gas generators, and combustion engines in the main propelling machinery space that use boil-off gas as fuel; or

(d) Equipment for services, other than those under paragraph (c) of this section, that use boil-off gas as fuel and that are located:

(1) In the main propelling machinery space; or

(2) a space specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.705 Cargo boil-off as fuel: General.

(a) Each cargo boil-off fuel system under § 154.703(c) must meet §§ 154.706 through 154.709.

(b) The piping in the cargo boil-off fuel system must have a connection for introducing inert gas and for gas freeing the piping in the machinery space.

(c) A gas fired main propulsion boiler or combustion engine must have a fuel oil fired pilot that maintains fuel flow as required under § 154.1854 if the gas fuel supply is cut-off.

§ 154.706 Cargo boil-off as fuel: Fuel lines.

(a) Gas fuel lines must not pass through accommodation, service, or control spaces. Each gas fuel line passing through other spaces must have a master gas fuel valve and meet one of the following:

(1) The fuel line must be a double-walled piping system with the annular space containing an inert gas at a pres-ure greater than the fuel pressure. Visual and audible alarms must be in-alled at the machinery control sta-on to indicate loss of inert gas pres-re.

(2) The fuel line must be installed in mechanically exhaust-ventilated pe or duct, having a rate of air ange of at least 30 changes per ur. The pressure in the space be-een the inner pipe and outer pipe or ct must be maintained at less than nospheric pressure. Continuous gas ection must be installed to detect ks in the ventilated space. The ven-tion system must meet § 154.1205.

(b) Each double wall pipe or vent duct must terminate in the ventilation hood or casing under § 154.707(a). Continuous gas detection must be installed to indicate leaks in the hood or casing.

§ 154.707 Cargo boil-off as fuel: Ventilation.

(a) A ventilation hood or casing must be installed in areas occupied by flanges, valves, and piping at the fuel burner to cause air to sweep across them and be exhausted at the top of the hood or casing.

(b) The hood or casing must be mechanically exhaust-ventilated and meet § 154.1205.

(c) The ventilated hood or casing must have an airflow rate specially approved by the Commandant.

§ 154.708 Cargo boil-off as fuel: Valves.

(a) Gas fuel lines to the gas consuming equipment must have two fail-closed automatic valves in series. A third valve, designed to fail-open, must vent that portion of pipe between the two series valves to the open atmosphere.

(b) The valves under paragraph (a) of this section must be arranged so that loss of boiler forced draft, flame failure, or abnormal gas fuel supply pressure automatically causes the two series valves to close and the vent valve to open. The function of one of the series valves and the vent valve may be performed by a single three-way valve.

(c) A master gas fuel valve must be located outside the machinery space, but be operable from inside the machinery space and at the valve. The valve must automatically close when there is:

(1) A gas leak detected under § 154.706(a)(2) or § 154.706(b);

(2) Loss of the ventilation under § 154.706(a)(2) or § 154.707(c); or

(3) Loss of inert gas pressure within the double-walled piping system under § 154.706(a)(1).

§ 154.709 Cargo boil-off as fuel: Gas detection equipment.

(a) The continuous gas detection system required under § 154.706(a)(2) and (b) must:

(1) Meet § 154.1350(c), (d), and (j) through (s); and

(2) Have a device that:

(i) Activates an audible and visual alarm at the machinery control station and in the wheelhouse if the methane concentration reaches 1.5 percent by volume; and

(ii) Closes the master gas fuel valve required under § 154.708(c) before the methane concentration reaches 3 percent by volume.

(b) The number and arrangement of gas sampling points must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

CARGO VENT SYSTEMS

§ 154.801 Pressure relief systems.

(a) Each cargo tank that has a volume of $20m^3$ ($706\ ft.^3$) or less must have at least one pressure relief valve.

(b) Each cargo tank that has a volume of more than $20m^3$ ($706\ ft.^3$) must have at least two pressure relief valves of the same nominal relieving capacity.

(c) Each pressure relief valve must:

(1) Meet Subpart 162.018 of this chapter or, if the valve is also capable of vacuum relief and the MARVS is 69 kPa gauge (10 psig) or less, Subpart 162.017 of this chapter, and have at least the capacity required under § 154.806;

(2) Not be set for a higher pressure than the MARVS;

(3) Have a fitting for sealing wire that prevents the set pressure from being changed without breaking the sealing wire;

(4) Be fitted on the cargo tank to remain in the vapor phase under conditions of 15° list and of 0.015 L trim by both the bow and stern;

(5) Vent to a vent mast under § 154.805, except a relief valve may vent to a common tank relief valve header if the back pressure is included in determining the required capacity under § 154.806;

(6) Not vent to a common header or common vent mast if the relief valves are connected to cargo tanks carrying chemically incompatible cargoes;

(7) Not have any stop valves or other means of isolating the cargo tank from its relief valve unless:

(i) The stop valves are interlocked or arranged so that only one pressure relief valve is out of service at any one time;

(ii) The interlock arrangement automatically shows the relief valve that is out of service; and

(iii) The other valves have the relieving capacity required under § 154.806, or all relief valves on the cargo tank are the same size and there is a spare of the same size, or there is a spare for each relief valve on a cargo tank.

(d) The pressure relief system must:

(1) If the design temperature is below 0° C (32° F), be designed to prevent the relief valve from becoming inoperative due to ice formation; and

(2) Be designed to prevent chattering of the relief valve.

[CGD 74-289, 44 FR 26009, May 3, 1979; 44 FR 59234, Oct. 15, 1979]

§ 154.802 Alternate pressure relief settings.

Cargo tanks with more than one relief valve setting must have one of the following arrangements:

(a) Relief valves that:

(1) Are set and sealed under § 154.801(c);

(2) Have the capacity under § 154.806; and

(3) Are interlocked so that cargo tank venting can occur at any time.

(b) Relief valves that have spacer pieces or springs that:

(1) Change the set pressure without pressure testing to verify the new setting; and

(2) Can be installed without breaking the sealing wire required under § 154.801(c)(3).

§ 154.804 Vacuum protection.

(a) Except as allowed under paragraph (b) of this section, each cargo tank must have a vacuum protection system meeting paragraph (a)(1) of this section and either paragraph (a)(2) or (a)(3) of this section.

(1) There must be a means of testing the operation of the system.

(2) There must be a pressure switch that operates an audible and visual alarm in the cargo control station identifying the tank and the alarm condition and a remote group audible and visual alarm in the wheelhouse. Both alarms must be set at or below 80% of the maximum external design pressure differential of the cargo tanks. There must be a second, independent pressure switch that automatically shuts off all suction of cargo liquid or vapor from the cargo tank and secures any refrigeration of that tank at or below the maximum external design pressure differential.

(3) There must be a vacuum relief valve that:

(i) Has a gas flow capacity at least equal to the maximum cargo discharge rate per tank;

(ii) Is set to open at or below the maximum external design pressure differential; and

(iii) Admits inert gas, cargo vapor from a source other than a cargo vapor header, or air except as prohibited under § 154.1710.

(b) A vacuum protection system does not have to be installed if the cargo tank is designed to withstand:

(1) A maximum external pressure differential exceeding 24.5 kPa gauge (3.55 psig); and

(2) The maximum external pressure differential that can be obtained:

(i) At maximum discharge rates with no vapor return to the cargo tanks;

(ii) By operation of the cargo refrigeration system; or

(iii) By drawing off vapor for use in accordance with § 154.703(c)

[CGD 74-289, 44 FR 26009, May 3, 1979; 44 FR 59234, Oct. 15, 1979]

§ 154.805 Vent masts.

Relief valves or common vent headers from relief valves must discharge to a vent mast that:

(a) Discharges vertically upward;

(b) Has a rain cap or other means of preventing the entrance of rain or snow;

(c) Has a screen with 25mm (1 inch) wire mesh or bars not more than 25mm (1 in.) apart on the discharge port;

(d) Extends at least to a height of B/3 or 6m (19.7 ft.), whichever is greater, above the weather deck and 6m (19.7 ft.) above the working level;

(e) For a cargo tank, does not exhaust cargo vapors within a radius of B or 25m (82 ft.), whichever is less, from any forced or natural ventilation intake or other opening to an accommodation, service, control station, or other gas-safe space, except that for vessels less than 90m (295 ft.) in length, shorter distances may be specially approved by the Commandant (G-MTH);

(f) For a containment system, except a cargo tank, does not exhaust vapor within a radius of 10m (32.8 ft.) or less from any forced or natural ventilation intake or other opening to an accommodation, service, control station, or other gas-safe space;

(g) Has drains to remove any liquid that may accumulate; and

(h) Prevents accumulations of liquid at the relief valves.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.806 Capacity of pressure relief valves.

Pressure relief valves for each cargo tank must have a combined relief capacity, including the effects of back pressure from vent piping, headers, and masts, to discharge the greater of the following with not more than a 20% rise in cargo tank pressure above the set pressure of the relief valves:

(a) The maximum capacity of an installed cargo tank inerting system if the maximum attainable working pressure of the cargo tank inerting system exceeds the set pressure of the relief valves.

(b) The quantity of vapors generated from fire exposure that is calculated under § 54.15-25 of this chapter.

ATMOSPHERIC CONTROL IN CARGO CONTAINMENT SYSTEMS

§ 154.901 Atmospheric control within cargo tanks and cargo piping systems.

(a) Each vessel must have a piping system for purging each cargo tank and all cargo piping.

(b) The piping system must minimize the pocketing of gas or air remaining after purging.

(c) For cargo tanks certificated to carry flammable gases, the piping system must allow purging the tank of flammable vapors before air is introduced and purging the tank of air before the tank is filled with cargo.

(d) Each cargo tank must have:

(1) Gas sampling points at its top and bottom; and

(2) Gas sampling line connections that are valved and capped above the deck.

§ 154.902 Atmospheric control within hold and interbarrier spaces.

(a) Vessels certificated to carry flammable cargo in cargo containment systems with full secondary barriers must have an inert gas system or onboard storage of inert gas that provides enough inert gas to meet the requirements of § 154.1848 for 30 days consumption.

(b) Vessels certificated to carry flammable cargo in cargo containment systems with partial secondary barriers must:

(1) Have an inert gas system or onboard inert gas storage that can inert the largest hold and interbarrier space so that the oxygen concentration is 8 percent or less by volume; and

(2) Meet paragraph (a) or (c)(2) of this section.

(c) Vessels certificated to carry only nonflammable cargo in cargo containment systems with secondary barriers must:

(1) Meet paragraph (a) of this section; or

(2) Have air drying systems that reduce the dewpoint of air admitted to hold or interbarrier spaces below the temperature of any surface in those spaces or −45° C (−49° F), whichever is warmer.

(d) Vessels with refrigerated independent tanks type C must have inert gas or air drying systems that reduce the dewpoint of any inert gas or air admitted to the hold spaces below the temperature of any surface in those spaces or −45° C (−49° F), whichever is warmer.

§ 154.903 Inert gas systems: General.

(a) Inert gas carried or generated to meet §§ 154.901, 154.902, and 154.1848 must be non-flammable and non-reactive with the cargoes that the vessel is certificated to carry and the materials of construction of the cargo tanks, hold and interbarrier spaces, and insulation.

(b) The boiling point and dewpoint at atmospheric pressure of the inert gas must be below the temperature of any surface in those spaces or −45° C (−49° F), whichever is warmer.

(c) For the temperatures and pressures at which the gas is stored and used, storage vessels and inert gas piping must meet §§ 154.450 and 154.500 respectively.

§ 154.904 Inert gas system: Controls.

The inert gas system must have:

(a) At least one check valve in the cargo area to prevent the back flow of cargo vapor into the inert gas system, or another means specially approved by the Commandant (G-MTH);

(b) If the inert gas system is in the machinery space or another space outside the cargo area, a second check valve in the cargo area meeting paragraph (a) of this section;

(c) Automatic and manual inert gas pressure controls; and

(d) Valves to isolate each inerted space.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.906 Inert gas generators.

The inert gas generator must:

(a) Produce an inert gas containing less than 5% oxygen by volume;

(b) Have a device to continuously sample the discharge of the generator for oxygen content; and

(c) Have an audible and visual alarm in the cargo control station that alarms when the inert gas contains 5% or more oxygen by volume.

§154.908 Inert gas generator: Location.

(a) Except as allowed in paragraph (b) of this section, an inert gas generator must be located in the main machinery space or a space that is not in the cargo area and does not have direct access to any accommodation, service, or control space.

(b) An inert gas generator that does not use flame burning equipment may be located in the cargo area if specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§154.910 Inert gas piping: Location.

Inert gas piping must not pass through or terminate in an accommodation, service, or control space.

§154.912 Inerted spaces: Relief devices.

Inerted spaces must be fitted with relief valves, rupture discs, or other devices specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979; CGD 82-063b, 48 FR 39629, Sept. 1, 1983]

ELECTRICAL

§154.1000 Applicability.

Sections 154.1005 through 154.1020 apply to flammable cargo and ammonia carriers.

§154.1002 Definition.

For the purposes of §§ 154.1005 through 154.1020, "gas-dangerous" does not include the weather deck of an ammonia carrier.

§154.1005 Equipment approval.

(a) Electrical equipment that is required to be intrinsically safe or exploion proof under § 154.1010 must be pecially approved by the Commanant or listed as intrinsically safe or xplosion proof by an independent aboratory that is specially approved y the Commandant (G-MTH), for lass I Division I locations and the roup that is specified in Table 4 for e cargo carried.

(b) Each submerged cargo pump otor installation must be specially approved by the Commandant (G-MTH).

(c) Electrical equipment that must be intrinsically safe to meet § 154.1010 must meet the definition in § 110.15-100(i) of this chapter.

(d) Electrical equipment that must be explosion proof to meet § 154.1010 must meet § 110.15-65(e) of this chapter.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1010 Electrical equipment in gas-dangerous space or zone.

(a) Except as allowed in this section, electrical equipment must not be installed in a gas-dangerous space or zone.

(b) Intrinsically safe electrical equipment and wiring may be in a gas-dangerous space or zone.

(c) A submerged cargo pump motor may be in a cargo tank if:

(1) Low liquid level, motor current, or pump discharge pressure automatically shuts down power to the pump motor if the pump loses suction;

(2) There is an audible and visual alarm at the cargo control station that actuates if the motor shuts down under the requirements of paragraph (c)(1) of this section; and

(3) There is a lockable circuit breaker or lockable switch that disconnects the power to the motor.

(d) A supply cable for a submerged cargo pump motor may be in a hold space.

(e) A hold space that has a tank that is not required to have a secondary barrier under § 154.459 may only have:

(1) Through runs of cable;

(2) Explosion-proof lighting fixtures;

(3) Depth sounding devices in gas-tight enclosures;

(4) Log devices in gas-tight enclosures; and

(5) Impressed current cathodic protection system electrodes in gas-tight enclosures.

(f) A space that is separated by a gastight steel boundary from a hold space that has a cargo tank that must have a secondary barrier, under the requirements of § 154.459, may only have:

(1) Through runs of cable;

(2) Explosion-proof lighting fixtures;

(3) Depth sounding devices in gastight enclosures;

(4) Log devices in gastight enclosures;

(5) Impressed current cathodic protection system electrodes in gastight enclosures;

(6) Explosion-proof motors that operate cargo system valves or ballast system valves; and

(7) Explosion-proof bells for general alarm systems.

(g) A cargo handling room may only have:

(1) Explosion-proof lighting fixtures; and

(2) Explosion-proof bells for general alarm systems.

(h) A space for cargo hose storage may only have:

(1) Explosion-proof lighting fixtures; and

(2) Through runs of cable.

(i) A space that has cargo piping may only have:

(1) Explosion-proof lighting fixtures; and

(2) Through runs of cable.

(j) A gas-dangerous zone on the weather deck may only have:

(1) Explosion-proof equipment that is for the operation of the vessel; and

(2) Through runs of cable.

(k) A space, except those under paragraphs (e) through (j) of this section, that has a direct opening to a gas-dangerous space or zone may only have the electrical equipment allowed in the gas-dangerous space or zone.

§ 154.1015 Lighting in gas-dangerous space.

(a) Each gas-dangerous space that has lighting fixtures must have at least two branch circuits for lighting.

(b) Each switch and each overcurrent protective device for any lighting circuit that is in a gas-dangerous space must open each conductor of the circuit simultaneously.

(c) Each switch and each overcurrent protective device for lighting in a gas-dangerous space must be in a gas-safe space.

§ 154.1020 Emergency power.

The emergency generator must be designed to allow operation at the final angle of heel under § 154.230(a).

FIREFIGHTING

Firefighting System: Exterior Water Spray

§ 154.1105 Exterior water spray system: General.

Each liquefied flammable gas vessel and each liquefied toxic gas vessel must have an exterior water spray system that meets §§ 154.1110 through 154.1135.

§ 154.1110 Areas protected by system.

Each water spray system must protect:

(a) All cargo tank surfaces that are not covered by the vessel's hull structure or a steel cover;

(b) Each cargo tank dome;

(c) Each on-deck storage vessel for flammable or toxic liquefied gases;

(d) Each cargo discharge and loading manifold;

(e) Each quick-closing valve under §§ 154.530, 154.532, and 154.538, and other control valves essential to cargo flow;

(f) Each boundary facing the cargo area of each superstructure that contains accommodation, service, or control spaces;

(g) Each boundary facing the cargo area of each deckhouse that contains accommodation, service, or control spaces; and

(h) Each boundary of each deckhouse that is within the cargo area and that is manned during navigation of the vessel or during cargo transfer operations, except the deckhouse roof if it is 2.4 m (8 ft.) or higher above the cargo containing structure.

[CGD 74-289, 44 FR 26009, May 3, 1979; 44 FR 59234, Oct. 15, 1979]

§ 154.1115 Discharge.

(a) The discharge density of each water spray system must be at least:

(1) 10000 $cm^3/m^2/min.$ (0.25 $gpm/ft.^2$) over each horizontal surface; and

(2) 4000 cm³/m²/min. (0.10 gpm/ft.²) against vertical surface, including the water rundown.

(b) The water spray protection under § 154.1110 (d) and (e) must cover an area in a horizontal plane extending at least 0.5 m (19 in.) in each direction from the pipes, fittings, and valves, or the area of the drip tray, whichever is greater.

§ 154.1120 Nozzles.

(a) Nozzles for the water spray system must be spaced to provide the minimum discharge density under § 154.1115 in each part of the protected area.

(b) The vertical distance between water spray nozzles for the protection of vertical surfaces must be 3.7 m (12 ft.) or less.

§ 154.1125 Pipes, fittings, and valves.

(a) Each pipe, fitting, and valve for each water spray system must meet Part 56 of this chapter.

(b) Each water spray main that protects more than one area listed in § 154.1110 must have at least one isolation valve at each branch connection and at least one isolation valve downstream of each branch connection to isolate damaged sections.

(c) Each valved cross-connection from the water spray system to the fire main must be outside of the cargo area.

(d) Each pipe, fitting, and valve for the water spray system must be made of fire resistant and corrosion resistant materials, such as galvanized steel or galvanized iron pipe.

(e) Each water spray system must have a means of drainage to prevent corrosion of the system and freezing of accumulated water in subfreezing temperatures.

(f) Each water spray system must have a dirt strainer that is located at the water spray system manifold or pump.

§ 154.1130 Sections.

(a) If a water spray system is divided into sections, each section must at least include the entire deck area bounded by the length of a cargo tank and the full beam of the vessel.

(b) If a water spray system is divided into sections the control valves must be at a single manifold that is aft of the cargo area.

§ 154.1135 Pumps.

(a) Water to the water spray system must be supplied by:

(1) A pump that is only for the use of the system;

(2) A fire pump; or

(3) A pump specially approved by the Commandant (G-MTH).

(b) Operation of a water spray system must not interfere with simultaneous operation of the fire main system at its required capacity. There must be a valved cross-connection between the two systems.

(c) Except as allowed under paragraph (d) of this section, each pump for each water spray system must have the capacity to simultaneously supply all areas named in § 154.1110.

(d) If the water spray system is divided into sections, the pump under paragraph (a) of this section must have the capacity to simultaneously supply the required discharge density under § 154.1115(a) for:

(1) The areas in §§ 154.1110(f) through (h) and 154.1115(b); and

(2) The largest section that includes the required protection under § 154.1110 (a), (b), and (c).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

FIREFIGHTING SYSTEM: DRY CHEMICAL

§ 154.1140 Dry chemical system: General.

Each liquefied flammable gas carrier must have a dry chemical firefighting system that meets §§ 154.1145 through 154.1170, Part 56 and Subpart 162.039 of this chapter.

§ 154.1145 Dry chemical supply.

(a) A vessel with a cargo carrying capacity less that 1000 m³ (35,300 ft.³) must have at least one self-contained dry chemical storage unit for the cargo area with an independent inert gas pressurizing source adjacent to each unit.

(b) A vessel with a cargo carrying capacity of 1000 m³ (35,300 ft.³) or more must have at least two self-contained dry chemical storage units for the cargo area with an independent inert gas pressurizing source adjacent to each unit.

(c) A vessel with bow and stern loading and discharge areas must have at least one self-contained dry chemical storage unit with an independent inert gas pressurizing source adjacent to the unit for each area.

(d) Each dry chemical storage unit and associated piping must be designed for:

(1) Sequential discharge of each hose line and each monitor for 45 seconds; and

(2) Simultaneous discharge of all hose lines and monitors for 45 seconds.

(e) Each fully charged dry chemical storage unit must have the greater of the following:

(1) Enough dry chemical to provide for sequential discharge of each attached hose and monitor for 45 seconds.

(2) Enough dry chemical to provide for simultaneous discharge of all attached hoses and monitors for 45 seconds.

§ 154.1150 Distribution of dry chemical.

(a) All locations on the above deck cargo area and the cargo piping outside that cargo area must be protected by:

(1) At least two dry chemical hand hose lines; or

(2) At least one dry chemical hand hose line and one dry chemical monitor.

(b) At least one dry chemical storage unit and hand hose line or monitor must be at the after end of the cargo areas.

(c) Each cargo loading and discharge manifold must be protected by at least one dry chemical monitor.

§ 154.1155 Hand hose line: Coverage.

The coverage for the area for a hand hose line under § 154.1150 must not exceed the length of the hand hose line except the coverage for the protection of areas that are inaccessible to personnel must not exceed one-half the projection of the hose at its rated discharge, or 10 m (32.8 ft.), whichever is less.

§ 154.1160 Monitor coverage of system.

The coverage of each dry chemical system monitor under § 154.1150 must not exceed:

(a) 10 m (32.8 ft.) at 10 kg/sec (22 lb/sec);

(b) 30 m (98.4 ft.) at 25 kg/sec (55 lb/sec);

(c) 40 m (131.2 ft.) at 45 kg/sec (99 lb/sec);

(d) An interpolation between 10 m (32.8 ft.) at 10 kg/sec (22 lb/sec) and 30 m (98.4 ft.) at 25 kg/sec (55 lb/sec); or

(e) An interpolation between 30 m (98.4 ft.) at 25 kg/sec (55 lb/sec) and 40 m (131.2 ft.) at 45 kg/sec (99 lb/sec).

§ 154.1165 Controls.

(a) Each dry chemical hand hose line must be one that can be actuated at its hose reel or hose storage cabinet.

(b) Each dry chemical monitor must be one that can be actuated and controlled at the monitor.

(c) A dry chemical monitor for the cargo loading and discharging manifold areas must be one that can be:

(1) Actuated from a location other than the monitor and manifold area; and

(2) Except for pre-aimed monitors, controlled from a location other than the monitor and manifold area.

(d) Each dry chemical storage unit must have independent piping with a stop valve in the piping for each remote hand hose line and remote monitor where the piping connects to the storage container, if the unit has:

(1) More than one hand hose line;

(2) More than one monitor; or

(3) A combination of hand hose lines and monitors.

(e) Each stop valve under paragraph (d) of the section must be capable of:

(1) Manual operation; and

(2) Being opened from the hose reel or monitor to which it is connected.

(f) Damage to any dry chemical system hose, monitor, pipe or control circuits must not prevent the operation of other hoses, monitors, or control circuit that are connected to the same storage unit.

§ 154.1170 Hand hose line: General.

Each dry chemical hand hose line must:

(a) Not be longer than 33m (108 ft.);

(b) Be stored on a hose reel or in a hose cabinet and be one that is operable whether or not it is unwound from a hose reel or removed from a hose cabinet;

(c) Be non-kinkable;

(d) Have a nozzle with a valve to start and stop the flow of chemical;

(e) Have a capacity of at least 3.5 kg/sec (7.7 lb./sec); and

(f) Be one that can be operated by one person.

CARGO AREA: MECHANICAL VENTILATION SYSTEM

§ 154.1200 Mechanical ventilation system: General.

(a) Each cargo compressor room, pump room, gas-dangerous cargo control station, and space that contains cargo handling equipment must have a fixed, exhaust-type mechanical ventilation system.

(b) The following must have a supply-type mechanical ventilation system:

(1) Each space that contains electric motors for cargo handling equipment.

(2) Each gas-safe cargo control station in the cargo area.

(3) Each gas-safe space in the cargo area.

(4) Each space that contains inert gas generators, except main machinery spaces.

§ 154.1205 Mechanical ventilation system: Standards.

(a) Each exhaust type mechanical ventilation system required under § 154.1200 (a) must have ducts for vapors from the following:

(1) The deck level.

(2) Bilges.

(3) If the vapors are lighter than air, the top of each space that personnel enter during cargo handling operations.

(b) The discharge end of each duct under paragraph (a) of this section must be at least 10 m (32.8 ft.) from ventilation intakes and openings to accomodation, service, control station, and other gas-safe spaces.

(c) Each ventilation system under § 154.1200 (a) and (b)(1) must change the air in that space and its adjoining trunks at least 30 times each hour.

(d) Each ventilation system for a gas-safe cargo control station in the cargo area must change the air in that space at least eight times each hour.

(e) A ventilation system must not recycle vapor from ventilation discharges.

(f) Each mechanical ventilation system must have its operational controls outside the ventilated space.

(g) No ventilation duct for a gas-dangerous space may pass through any machinery, accomodation, service, or control space, except as allowed under § 154.703.

(h) Each electric motor that drives a ventilation fan must not be within the ducts for any space that may contain flammable cargo vapors.

(i) Ventilation impellers and the housing in way of those impellers on a flammable cargo carrier must meet one of the following:

(1) The impeller, housing, or both made of non-metallic material that does not generate static electricity.

(2) The impeller and housing made of non-ferrous material.

(3) The impeller and housing made of austenitic stainless steel.

(4) The impeller and housing made of ferrous material with at least 13mm (0.512 in.) tip clearance.

(j) No ventilation fan may have any combination of fixed or rotating components made of an aluminum or magnesium alloy and ferrous fixed or rotating components.

(k) Each ventilation intake and exhaust must have a protective metal screen of not more than 13mm (0.512 in.) square mesh.

§ 154.1210 Hold space, void space, cofferdam, and spaces containing cargo piping.

(a) Each hold space, void space, cofferdam, and spaces containing cargo piping must have:

(1) A fixed mechanical ventilation system; or

(2) A fixed ducting system that has a portable blower that meets § 154.1205(i) and (j).

(b) A portable blower in any personnel access opening must not reduce the area of that opening so that the opening does not meet § 154.340.

INSTRUMENTATION

§ 154.1300 Liquid level gauging system: General.

(a) If Table 4 lists a closed gauge for a cargo, the liquid level gauging system under § 154.1305 must be closed gauges that do not have any opening through which cargo liquid or vapor could escape, such as an ultrasonic device, float type device, electronic or magnetic probe, or bubble tube indicator.

(b) If Table 4 lists a restricted gauge for a cargo, the liquid level gauging system under § 154.1305 must be closed gauges that meet paragraph (a) of this section or restricted gauges that do not vent the cargo tank's vapor space, such as a fixed tube, slip tube, or rotary tube.

§ 154.1305 Liquid level gauging system: Standards.

(a) Each cargo tank must have at least one liquid level gauging system that is operable:

(1) At pressures up to, and including, the MARVS of the tank; and

(2) At temperatures that are within the cargo handling temperature range for all cargoes carried.

(b) Unless the cargo tank has one liquid gauging system that can be repaired and maintained when the tank contains cargo, each cargo tank must have at least two liquid level gauging systems that meet paragraph (a) of this section.

(c) Each liquid level gauging system must measure liquid levels from 400 mm (16 in.) or less from the lowest point in the cargo tank, except collection wells, to 100 percent full.

§ 154.1310 Closed gauge shut-off valve.

Each closed gauge that is not mounted directly on the cargo tank must have a shut-off valve that is as close to the tank as practical.

§ 154.1315 Restricted gauge excess flow valve.

Each restricted gauge that penetrates a cargo tank must have an excess flow valve unless the gauge meets § 154.536.

§ 154.1320 Sighting ports, tubular gauge glasses, and flat plate type gauge glasses.

(a) Cargo tanks may have sighting ports as a secondary means of liquid level gauging in addition to the gauges under § 154.1305, if:

(1) The tank has a MARVS that is less than 69 kPa gauge (10 psig);

(2) The port has a protective cover and an internal scale; and

(3) The port is above the liquid level.

(b) Tubular gauge glasses must not be liquid level gauges for cargo tanks.

(c) Plate type gauge glasses must not be liquid level gauges for cargo tanks, except deck tanks if the gauge connections have excess flow valves.

§ 154.1325 Liquid level alarm system: All cargo tanks.

Except as allowed under § 154.1330, each cargo tank must have a high liquid level alarm system that:

(a) Is independent of the liquid level gauging system under § 154.1305;

(b) Actuates quick-closing valves under §§ 154.530, 154.532, and 154.538 or a stop valve in the cargo tank loading line to prevent the tank from becoming 100 percent liquid full and without causing the pressure in the loading lines to exceed the design pressure; and

(c) Actuates an audible and visual alarm at the cargo control station at the liquid level at which the valves under paragraph (b) of this section are actuated or at some lower liquid level.

§ 154.1330 Liquid level alarm system: Independent tank type C.

Independent tanks type C need not have the high liquid level alarm system under § 154.1325 if:

(a) The tank volume is less than 200 m^3 (7,060 $ft.^3$); or

(b) The tank can withstand the maximum possible pressure during loading, that pressure is below the relief valve setting, and overflow of the tank cannot occur.

§ 154.1335 Pressure and vacuum protection.

(a) Each cargo tank must have the following:

(1) A pressure gauge that:

(i) Monitors the vapor space;

(ii) Is readable at the tank; and

(iii) Has remote readouts at the cargo control station.

(2) If vacuum protection is required under § 154.804, a vacuum gauge meeting paragraphs (a)(1)(i), (a)(1)(ii), and (a)(1)(iii) of this section.

(b) The vessel must have at least one high pressure alarm that:

(1) Actuates before the pressure in any cargo tank exceeds the maximum pressure specially approved by the Commandant (G-MTH); and

(2) Actuates an audible and visual alarm at the cargo control station, and a remote group alarm in the wheelhouse.

(c) If vacuum protection is required under § 154.804, the vessel must have at least one low pressure alarm that:

(1) Actuates before the pressure in any cargo tank falls below the minimum pressure specially approved by the Commandant (G-MTH); and

(2) Actuates an audible and visual alarm at the cargo control station, and a remote group alarm in the wheelhouse.

(d) At least one pressure gauge must be fitted on each:

(1) Enclosed hold;

(2) Enclosed interbarrier space;

(3) Cargo pump discharge line;

(4) Liquid cargo manifold; and

(5) Vapor cargo manifold.

(e) There must be a local manifold pressure gauge between each manifold stop valve and each hose connection to the shore.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1340 Temperature measuring devices.

(a) Each cargo tank must have devices that measure the temperature:

(1) At the bottom of the tank; and

(2) Near the top of the tank and below the maximum liquid level allowed under § 154.1844.

(b) Each device required by paragraph (a) must have a readout at the cargo control station.

(c) Except for independent tanks type C, each cargo containment system for a design temperature colder than −55° C (−67° F) must have temperature measuring devices that meet the following:

(1) The number and location of the devices must be specially approved by the Commandant (G-MTH).

(2) The devices must be within the cargo tank's insulation or on the adjacent hull structure.

(3) Each device must show the temperature continuously or at regular intervals of one hour or less.

(4) Each device must actuate an audible and visual alarm at the cargo control station and a remote group alarm in the wheelhouse before the temperature of the steel of the adjacent hull structure is cooled below the lowest temperature allowed for the steel under § 154.172.

(d) For each cargo tank with a design temperature colder than −55° C (−67° F), the number and arrangement of the devices that show the temperature of the tank during cool down procedures must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1345 Gas detection.

(a) Each vessel carrying a cargo that is designated with an "I" or "I and T" in Table 4 must have:

(1) A fixed flammable gas detection system that meets § 154.1350; and

(2) Two portable gas detectors that can each measure 0 to 100% of the lower flammable limit of the cargo carried.

(b) Each vessel carrying a cargo that is designated with a "T" or "I and T" in Table 4 must have:

(1) Two portable gas detectors that show if the concentration of cargo is above or below the threshold limit value listed in 29 CFR 1910.1000 for that cargo; and

(2) Fixed gas sampling tubes in each hold space and interbarrier space with:

(i) The number of tubes specially approved by the Commandant (G-MTH);

(ii) Each tube valved and capped above the main deck unless it is connected to a fixed toxic gas detector;

(iii) If the vessel carries cargo that is heavier than the atmosphere of the space, each tube's open end in the lower part of the space;

(iv) If the vessel carries cargo that is lighter than the atmosphere of the space, each tube's open end in the upper part of the space;

(v) If the vessel carries cargo that is heavier than the atmosphere of the space and another cargo that is lighter than the atmosphere of the space, tubes with their open ends in the lower part of the space and tubes with their open ends in the upper part of the space; and

(vi) If the vessel carries cargo that can be both heavier and lighter than the atmosphere of the space, tubes with their open ends in the lower part of the space and tubes with their open ends in the upper part of the space.

(c) A vessel that carries methyl bromide or sulfur dioxide must have a fixed gas detection system that is not located in a gas-safe space.

(d) A vessel that carries sulfur dioxide must have a fixed gas detection system that meets § 154.1350 except paragraph (j).

(e) Each alarm under § 154.1350(e) on a vessel that carries methyl bromide or sulfur dioxide must be set at or below the threshold limit value listed in 29 CFR 1910.1000 for the cargo carried.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1350 Flammable gas detection system.

(a) The vessel must have a fixed flammable gas detection system that has sampling points in:

(1) Each cargo pump room;

(2) Each cargo compressor room;

(3) Each motor room for cargo handling machinery;

(4) Each cargo control station that is not gas-safe;

(5) Each hold space, interbarrier space, and other enclosed spaces, except fuel oil or ballast tanks, in the cargo area, unless the vessel has independent tanks type C; and

(6) Each space between the doors of an air lock under § 154.345.

(b) The sampling points under paragraph (a) of this section must meet § 154.1345(b)(2) (iii) through (vi).

(c) Gas sampling lines for the flammable gas detection system must not pass through any gas-safe space, except the gas-safe space in which the gas detection equipment is located.

(d) Gas detection systems must have a readout with meters that show flammable gas concentration over the concentration or volume ranges under paragraph (t) or (u) of this section.

(e) Each flammable gas detection system must have audible and visual alarms that are actuated at a cargo concentration that is 30% or less of the lower flammable limit in air of the cargo carried.

(f) Each flammable gas detection system must have an audible and visual alarm for power failure and loss of gas sampling flow.

(g) The alarms under paragraphs (e) and (f) of this section must signal in the space where the gas detection system's readout is located and must meet § 154.1365.

(h) Remote group alarms, that indicate that one of the alarm conditions under paragraphs (e) and (f) of this section exists, must meet § 154.1365 and must be in each wheelhouse and in each cargo control station if the gas detection system's readout is not located in those spaces.

(i) Each flammable gas detection system must monitor each sampling point at 30 minute or shorter intervals.

(j) Electrical equipment for each flammable gas detection system that is in a gas-dangerous space or area must meet §§ 154.1000 through 154.1015.

(k) Each flammable gas detection system must have enough flame arrestors for all gas sampling lines to prevent flame propagation to the spaces served by the system through the sampling lines.

(l) Each flammable gas detection system must have a filter that removes particulate matter in each gas sampling line.

(m) Each filter under paragraph (l) of this section must be located where it can be removed during vessel operation, unless it can be freed by back pressure.

(n) Each flammable gas detection system in a gas-safe space must:

(1) Have a shut-off valve in each sampling line from an enclosed space, such as a hold or interbarrier space; and

(2) Exhaust gas to a safe location in the open atmosphere and away from all ignition sources.

(o) Each flammable gas detection system must not have common sampling lines, except sampling lines may be manifolded at the gas detector location if each line has an automatic valve that prevents cross-communication between sampling points.

(p) Each flammable gas detection system must have at least one connection for injecting zero gas and span gas into the system for testing and calibration.

(q) Each flammable gas detection system must have span gas for testing and calibration that is of known concentration.

(r) The calibration test procedure and type and concentration of span gas under paragraph (q) of this section must be on or in each gas analyzer cabinet.

(s) Each flammable gas detection system must have at least one flow meter capable of measuring the flow to the gas analyzer, and must provide a means for ensuring that there is a positive flow in the right direction in each sampling line at all times.

(t) Each flammable gas detection system must measure gas concentrations that:

(1) Are at least 0% through 200% of the alarm concentration; and

(2) Allow calibration of the equipment with span gas.

(u) In each hold and each interbarrier space that contains tanks other than independent tanks type A, B, or C, the flammable gas detection system must measure cargo concentrations of 0 to 100% by volume with:

(1) An analyzer other than the one under paragraph (t) of this section; or

(2) The analyzer under paragraph (t) of this section with a scale switch that automatically returns the analyzer to the concentration range under paragraph (t) of this section when released.

§ 154.1360 Oxygen analyzer.

The vessel must have a portable analyzer that measures oxygen levels in an inert atmosphere.

§ 154.1365 Audible and visual alarms.

(a) Each audible alarm must have an arrangement that allows it to be turned off after sounding. For remote group alarms this arrangement must not interrupt the alarm's actuation by other faults.

(b) Each visual alarm must be one that can be turned off only after the fault that actuated it is corrected.

(c) Each visual alarm must be marked to show the type and, except for remote group alarms, the location of each fault that actuates it.

(d) Each vessel must have means for testing each alarm.

§ 154.1370 Pressure gauge and vacuum gauge marking.

Each pressure gauge and vacuum gauge under § 154.1335(a) must be marked with the maximum and minimum pressures that are specified on the vessel's certificate for the cargo carried.

§ 154.1375 Readout for temperature measuring device: Marking.

Each readout under § 154.1340 for a device that measures temperature in a cargo tank must be marked with the design temperature specified for the cargo tank on the vessel's certificate.

SAFETY EQUIPMENT

§ 154.1400 Safety equipment: All vessels.

(a) Instead of the equipment under § 35.30-20 of this chapter, a vessel of less than 25,000 m^3 cargo capacity must have the following personnel safety equipment:

(1) Six self-contained, pressure-demand-type, air-breathing apparatus approved by the Mining Enforcement and Safety Administration (MESA) or

the National Institute for Occupational Safety and Health (NIOSH), each having at least a 30 minute capacity.

(2) Nine spare bottles of air for the self-contained air-breathing apparatus, each having at least a 30 minute capacity.

(3) Six steel-cored lifelines.

(4) Six Type II or Type III flashlights constructed and marked in accordance with ASTM F1014-1986.

(5) Three fire axes.

(6) Six helmets that meet ANSI Safety Requirements for Industrial Head Protection, Z-89.1 (1969).

(7) Six sets of boots and gloves that are made of rubber or other electrically non-conductive material.

(8) Six sets of goggles that meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1 (1979).

(9) Three outfits that protect the skin from scalding steam and the heat of a fire, and that have a water resistant outer surface.

(10) Three chemical protective outfits that protect the wearers from the particular personnel hazards presented by the cargo vapor.

(b) Instead of the equipment under § 35.30-20 of this chapter, a vessel of 25,000 m³ cargo capacity or more must have the following personnel safety equipment:

(1) Eight self-contained, pressure-demand-type, air-breathing apparatus approved by the Mining Enforcement and Safety Administration (MESA) or the National Institute for Occupational Safety and Health (NIOSH), each having at least a 30 minute capacity.

(2) Nine spare bottles of air for the self-contained air-breathing apparatus, each having at least a 30 minute capacity.

(3) Eight steel-cored lifelines.

(4) Eight Type II or Type III flashlights constructed and marked in accordance with ASTM F1014-1986.

(5) Three fire axes.

(6) Eight helmets that meet ANSI Safety Requirements for Industrial Head Protection, Z-89.1 (1969).

(7) Eight sets of boots and gloves that are made of rubber or other electrically non-conductive material.

(8) Eight sets of goggles that meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1 (1979).

(9) Five outfits that protect the skin from scalding steam and the heat of a fire, and that have a water resistant outer surface.

(10) Three chemical protective outfits that protect the wearers from the particular personnel hazards presented by the cargo vapor.

(c) When Table 4 references this section, a vessel carrying the listed cargo must have the following additional personnel protection equipment:

(1) Three self-contained, pressure-demand-type, air-breathing apparatus approved by the Mining Enforcement and Safety Administration (MESA) or the National Institute for Occupational Safety and Health (NIOSH), each having at least a 30 minute capacity.

(2) Nine spare bottles of air for the self-contained air-breathing apparatus, each having at least a 30 minute capacity.

(3) Three steel-cored lifelines.

(4) Three Type II or Type III flashlights constructed and marked in accordance with ASTM F1014-[illegible].

(5) Three helmets that meet ANSI Safety Requirements for Industrial Head Protection, Z-89.1 (1969).

(6) Three sets of boots and gloves that are made of rubber or other electrically non-conductive material.

(7) Three sets of goggles that meet the specifications of ANSI Practice for Occupational and Educational Eye and Face Protection, Z-87.1 (1979).

(8) Three chemical protective outfits that protect the wearers from the particular personnel hazards presented by the cargo vapor.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 77-069, 52 FR 31630, Aug. 21, 1987; CGD 82-042, 17705, May 18, 1988]

§ 154.1405 Respiratory protection.

When Table 4 references this section, a vessel carrying the listed cargo must have:

(a) Respiratory protection equipment for each person on board that protects the person from the cargo vapor for at least 5 minutes; and

(b) Two additional sets of respiratory protection equipment that:

(1) Are stowed in the wheelhouse; and

(2) Protects the wearer from the cargo vapor for at least 5 minutes.

§ 154.1410 Decontamination shower.

When Table 4 references this section, a vessel carrying the listed cargo must have a decontamination shower and an eye wash that:

(a) Are on the weatherdeck; and

(b) Have their location marked EMERGENCY SHOWER in letters:

(1) 7.6 cm (3 in.) high; and

(2) 5.1 cm (2 in.) wide.

§ 154.1415 Air compressor.

Each vessel must have an air compressor to recharge the bottles for the air-breathing apparatus.

§ 154.1420 Stretchers and equipment.

Each vessel must have:

(a) Two stretchers or wire baskets; and

(b) Equipment for lifting an injured person from a cargo tank, hold, or void space.

§ 154.1430 Equipment locker.

One of each item of equipment under §§ 154.1400 and 154.1420 must be stowed in a marked locker:

(a) On the open deck in or adjacent to the cargo area; or

(b) In the accommodation house, near to a door that opens onto the main deck.

§ 154.1435 Medical first aid guide.

Each vessel must have a copy of the *IMO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods*, printed by IMO, London, U.K.

§ 154.1440 Antidotes.

Each vessel must have the antidotes prescribed in the *IMO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods*, printed by IMO, London, U.K. for the cargoes being carried.

§ 154.1445 Lifesaving devices.

The design of the lifeboats and liferafts must allow for launching at the final angle of heel from the lower side of the vessel.

Subpart D—Special Design and Operating Requirements

§ 154.1700 Purpose.

This subpart prescribes design and operating requirements that are unique for certain cargoes regulated by this part.

§ 154.1702 Materials of construction.

When Table 4 references one of the following paragraphs in this section, the materials in the referenced paragraph must not be in components that contact the cargo liquid or vapor:

(a) Aluminum and aluminum bearing alloys.

(b) Copper and copper bearing alloys.

(c) Zinc or galvanized steel.

(d) Magnesium.

(e) Mercury.

(f) Acetylide forming materials, such as copper, silver, and mercury.

§ 154.1705 Independent tank type C.

The following cargoes must be carried in an independent tank type C that meets § 154.701(a):

(a) Ethylene oxide.

(b) Methyl bromide.

(c) Sulfur dioxide.

§ 154.1710 Exclusion of air from cargo tank vapor spaces.

When a vessel is carrying acetaldehyde, butadiene, ethylene oxide, or vinyl chloride, the master shall ensure that air is:

(a) Purged from the cargo tanks and associated piping before the cargo is loaded; and

(b) Excluded after the cargo is loaded by maintaining a positive pressure of at least 13.8 kPa gauge (2 psig) by:

(1) Introducing a gas that:

(i) Is not reactive;

(ii) Is not flammable; and

(iii) Does not contain more than 0.2% oxygen by volume; or

(2) Controlling the cargo temperature.

§ 154.1715 Moisture control.

When a vessel is carrying sulfur dioxide, the master shall ensure that:

(a) A cargo tank is dry before it is loaded with sulfur dioxide; and

(b) Air or inert gas admitted into a cargo tank carrying sulfur dioxide during discharging or tank breathing has a moisture content equal to or less than the moisture content of air with a dewpoint of −45° C (−49° F) at atmospheric pressure.

§ 154.1720 Indirect refrigeration.

A refrigeration system that is used to cool acetaldehyde, ethylene oxide, or methyl bromide, must be an indirect refrigeration system that does not use vapor compression.

§ 154.1725 Ethylene oxide.

(a) A vessel carrying ethylene oxide must:

(1) Have cargo piping, vent piping, and refrigeration equipment that have no connections to other systems;

(2) Have valves, flanges, fittings, and accessory equipment made of steel, stainless steel, except types 416 and 442, or other material specially approved by the Commandant (G-MTH);

(3) Have valve disk faces, and other wearing parts of valves made of stainless steel containing not less than 11% chromium;

(4) Have gaskets constructed of spirally wound stainless steel with teflon or other material specially approved by the Commandant (G-MTH);

(5) Not have asbestos, rubber, or cast iron components in the cargo containment system and piping;

(6) Not have threaded joints in cargo piping;

(7) Have a water spray system under § 154.1105 that protects the above deck cargo piping; and

(8) Have a nitrogen inerting system or on board nitrogen gas storage that can inert the vapor space of an ethylene oxide cargo tank for a period of 30 days under the condition of paragraph (e) of this section.

(b) Cargo hose used for ethylene oxide must:

(1) Be specially approved by the Commandant (G-MTH); and

(2) Be marked "For (Alkylene or Ethylene) Oxide Transfer Only."

(c) Ethylene oxide must be maintained at less than 30°C (86° F).

(d) Cargo tank relief valves for tanks containing ethylene oxide must be set at 539 kPa gauge (78.2 psig) or higher.

(e) The vapor space of a cargo tank carrying ethylene oxide must be maintained at a nitrogen concentration of 45% by volume.

(f) A vessel must have a method for jettisoning ethylene oxide that meets §§ 154.356 and 154.1872.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1730 Ethylene oxide: Loading and off loading.

(a) The master shall ensure that before ethylene oxide is loaded into a cargo tank:

(1) The tank is thoroughly clean, dry, and free of rust;

(2) The hold spaces are inerted with an inert gas that meets § 154.1710(b)(1); and

(3) The cargo tank vapor space is inerted with nitrogen.

(b) Ethylene oxide must be off loaded by a deepwell pump or inert gas displacement.

(c) Ethylene oxide must not be carried in deck tanks.

§ 154.1735 Methyl acetylene-propadiene mixture.

(a) The composition of the methyl acetylene-propadiene mixture at loading must be within the following limits or specially approved by the Commandant (G-MTH):

(1) One composition is:

(i) Maximum methyl acetylene and propadiene molar ratio of 3 to 1;

(ii) Maximum combined concentration of methyl acetylene and propadiene of 65 mole percent;

(iii) Minimum combined concentration of propane, butane, and isobutane of 24 mole percent, of which at least one-third (on a molar basis) must be butanes and one-third propane; and

(iv) Maximum combined concentration of propylene and butadiene of 10 mole percent.

(2) A second composition is:

(i) Maximum methyl acetylene and propadiene combined concentration of 30 mole percent;

(ii) Maximum methyl acetylene concentration of 20 mole percent;

(iii) Maximum propadiene concentration of 20 mole percent;

(iv) Maximum propylene concentration of 45 mole percent;

(v) Maximum butadiene and butylenes combined concentration of 2 mole percent;

(vi) A minimum saturated C_4 hydrocarbon concentration of 4 mole percent; and

(vii) A minimum propane concentration of 25 mole percent.

(b) A vessel carrying a methyl acetylene-propadiene mixture must have a refrigeration system without vapor compression or have a refrigeration system with the following features:

(1) A vapor compressor that does not raise the temperature and pressure of the vapor above 60°C (140°F) and 1.72 MPa gauge (250 psig) during its operation and that does not allow vapor to stagnate in the compressor while it continues to run.

(2) Discharge piping from each compressor stage or each cylinder in the same stage of a reciprocating compressor that has:

(i) Two temperature actuated shutdown switches set to operate at 60° C (140° F) or less;

(ii) A pressure actuated shutdown switch set to operate at 1.72 MPa guage (250 psig) or less; and

(iii) A safety relief valve set to relieve at 1.77 MPa gauge (256 psig) or less.

(3) A relief valve that vents to a mast meeting § 154.805 and that does not relieve into the compressor suction line.

(4) An alarm that sounds in the cargo control station and in the wheelhouse when any of the high pressure or high temperature switches under paragraphs (b)(2)(i) and (b)(2)(ii) of this section operate.

(c) A vessel carrying a methyl acetylene-propadiene mixture must have separate cargo piping, vent piping, and refrigeration equipment for methyl acetylene-propadiene that are segregated from other cargo piping, vent piping and refrigeration equipment on the vessel.

[CGD 74-289, 44 FR 26009, May 3, 1979; 44 FR 59234, Oct. 15, 1979; CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1740 Vinyl chloride: Inhibiting and inerting.

When a vessel is carrying vinyl chloride, the master shall ensure that:

(a) Section 154.1818 is met; or

(b) Section 154.1710 is met, and the oxygen content of inert gas is less than 0.1% by volume.

§ 154.1745 Vinyl chloride: Transferring operations.

A vessel carrying vinyl chloride must meet § 40.15-1 of this chapter.

§ 154.1750 Butadiene or vinyl chloride: Refrigeration system.

A refrigeration system for butadiene or vinyl chloride must not use vapor compression unless it:

(a) Avoids any stagnation points where uninhibited liquid can accumulate; or

(b) Has inhibited liquid from the cargo tank added to the vapor upstream of the condenser.

§ 154.1755 Nitrogen.

Except for deck tanks and their piping systems, cargo containment systems and piping systems carrying nitrogen must be specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1760 Liquid ammonia.

The master shall ensure that no person sprays liquid ammonia into a cargo tank containing more than 8% oxygen by volume.

Subpart E—Operations

§ 154.1800 Special operating requirements under Part 35 of this chapter.

Each vessel must meet the requirements of Part 35 of this chapter except § 35.30-20.

§ 154.1801 Certificates, letters, and endorsements: U.S. flag vessels.

No person may operate a U.S. flag vessel unless the vessel has a Certificate of Inspection, issued under Subchapter D of this chapter, which is endorsed with the name of the cargo that it is allowed to carry.

§ 154.1802 Certificates, letters and endorsements: Foreign flag vessels.

(a) No person may operate on the navigable waters of the United States a foreign flag vessel, whose flag administration issues IMO Certificates, unless the vessel has:

(1) An IMO Certificate issued by the flag administration that is endorsed with the name of the cargo that it is allowed to carry, and, except when entering United States waters to be examined as required by § 154.150, a Certificate of Compliance [1] issued by the Coast Guard endorsed under this part with the name of the cargo that it is allowed to carry; or

(2) Special approval under § 154.30.

(b) No person may operate on the navigable waters of the United States a foreign flag vessel, whose flag administration does not issue IMO Certificates, unless the vessel has:

(1) Except when entering United States waters to be examined as required by § 154.150, a Certificate of Compliance [1] issued by the Coast Guard endorsed under this part with the name of the cargo it is allowed to carry; or

(2) Special approval under § 154.30.

(c) No person may operate on the navigable waters of the United States a foreign flag vessel unless the vessel has onboard the following plans and information which except for the certificates under paragraph (c)(1) of this section, are in English:

(1) The vessel's Cargo Ship Safety Construction Certificate and Cargo Ship Safety Equipment Certificate issued under the International Convention for Safety of Life at Sea, 1974.

(2) A description and schematic plan of the arrangement for inerting cargo tanks, hold spaces, and interbarrier spaces.

(3) A description of the cargo tank gauging equipment.

(4) A description and instruction manual for the calibration of the cargo leak detector equipment.

(5) A schematic plan that shows the locations of leak detectors and sampling points.

(6) If the vessel carries methane, a description of the systems for cargo temperature and pressure control. (See §§ 154.703 through 154.709).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 81-052, 50 FR 8735, Mar. 5, 1985; CGD 77-069, 52 FR 31631, Aug. 21, 1987; CGD 90-008, 55 FR 30663, July 26, 1990]

§ 154.1803 Expiration of Certificates of Compliance.

(a) A Certificate of Compliance expires after a period not to exceed twenty-four months from the date of the examination under § 154.150.

(b) If a vessel's IMO Certificate of Fitness expires or otherwise becomes invalid, its Certificate of Compliance becomes invalid for the carriage of cargoes listed in Table 4 of this part or authorized by special approval under § 154.12. To maintain the validity of the Certificate of Compliance, the vessel's owner must submit a copy of any revised or reissued IMO Certificate to Commandant (G-MTH).

[CGD 81-052, 50 FR 8735, Mar. 5, 1985]

§ 154.1804 Document posted in wheelhouse.

No person may operate a U.S. flag vessel unless the documents under § 154.1801 are under glass in a conspicuous place in the wheelhouse.

§ 154.1806 Regulations on board.

No person may operate a U.S. flag vessel unless a copy of this part and a copy of Part 35 of this chapter are on board.

§ 154.1808 Limitations in the endorsement.

No person may operate a vessel unless that person complies with all limitations in the endorsement on the vessel's Certificate of Inspection or Certificate of Compliance.

[CGD 81-052, 50 FR 8735, Mar. 5, 1985]

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[1] Until the Certificate of Compliance form is developed, the Letter of Compliance with a Subchapter O endorsement for the carriage of liquefied gases will serve the purpose of the endorsed Certificate of Compliance.

§ 154.1809 Loading and stability manual.

(a) No person may operate a vessel unless that vessel has on board a loading and stability manual.

(b) The loading and stability manual must contain:

(1) Information that enables the master to load and ballast the vessel while keeping structural stresses within design limits; and

(2) The information required by § 170.110 of this chapter.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 79-023, 49 FR 51010, Nov. 4, 1983]

§ 154.1810 Cargo manual.

(a) No person may operate a foreign flag vessel, whose flag administration does not issue IMO Certificates, on the navigable waters of the United States, or a U.S. flag vessel, unless the vessel has on board a cargo manual containing the following information:

(1) A description of each cargo carried, its handling hazards as a liquid or as a gas including frostbite or asphyxiation, its safety equipment and necessary first aid measures required by this part.

(2) A description of the dangers of asphyxiation from the inerting gases used on the vessel.

(3) The measures that mitigate embrittlement of steel structure in way of cargo leakage.

(4) The use of the firefighting systems on the vessel.

(5) The features of the cargo containment system that affect its operation and maintenance, including pressure and temperature ranges and relief valve settings.

(6) Pressures, temperatures, and liquid levels for all operations.

(7) General information derived from the first loading of the vessel.

(8) Alarm settings.

(9) Descriptions of the components of the cargo system, including the following:

(i) Liquid cargo system.

(ii) Liquid recirculating or condensate return system.

(iii) Cargo tank cool-down system.

(iv) Cargo tank warm-up or vaporization system.

(v) Gas main system.

(vi) Cargo tank or compressor relief system and blocked liquid or gas relief system.

(vii) Inerting system.

(viii) Boil-off gas compressor or reliquefaction system.

(ix) Gas detection systems.

(x) Alarm or safety indication systems.

(xi) Cargo jettisoning system.

(xii) The system for using boil-off gas as fuel.

(10) A description of cargo loading and discharge operations, including simultaneous handling of multigrades of cargo and ballast.

(11) A description of cargo operations during the voyage.

(12) A description of cargo tank cool-down and warm-up operations including purging with inert gas and air.

(13) A description of hull and cargo tank temperature monitoring systems.

(14) A description of gas detection systems and alarm or safety systems.

(15) A description of the following conditions and their symptoms, including emergency measures and corrective actions:

(i) Cargo or ballast valve malfunction.

(ii) Low cargo tank gas pressure.

(iii) High fill level shutdown.

(iv) Gas compressor shutdown.

(v) Hull cold spots.

(vi) Cargo piping leaks.

(vii) Primary or secondary barrier failure.

(viii) Hold boundary structural failure.

(ix) Fire in vent mast head.

(x) Reliquefaction plant failure.

(xi) Vaporizer malfunction or failure.

(xii) Piping or cargo valve freeze-up.

(16) Any other matters relating to operation of the cargo systems.

(17) The operational means to maintain the vessel in a condition of positive stability in accordance with the loading and stability manual under § 154.1809 through all conditions of:

(i) Loading and deballasting; and

(ii) Unloading and ballasting.

(b) The master shall ensure that the cargo manual is kept up-to-date.

§ 154.1812 Operational information for terminal personnel.

The master shall ensure that terminal personnel are told the operational information required by § 154.1810(a)(17).

§ 154.1814 Cargo information cards.

(a) No person may operate a vessel unless a cargo information card for each cargo being transported is carried either in the wheelhouse, in the ship's office, or in another location easily accessible to the person in charge of the watch.

(b) When a vessel is moored at a terminal, the master shall ensure that a set of information cards is in the possession of the terminal's person in charge of cargo transfer operations.

(c) Each card must be at least 17 cm x 24 cm (6¾ in. x 9½ in.), have printing on one side only, and must contain the following information about the cargo:

(1) Name as listed in Table 4.

(2) Appearance.

(3) Odor.

(4) Safe handling procedures, including special handling instructions, and handling hazards.

(5) Procedures to follow in the event of spills, leaks, or uncontrolled cargo release.

(6) Procedures to be followed if a person is exposed to the cargo.

(7) Firefighting procedures and materials.

§ 154.1816 Cargo location plan.

The master shall ensure that:

(a) A cargo location plan is prepared that gives:

(1) The location and number of each cargo tank; and

(2) The name of the cargo in each tank;

(b) One cargo location plan is kept with the sets of cargo information cards required under § 154.1814; and

(c) The cargo names in the cargo location plan do not differ from the names of the cargoes listed in Table 4.

§ 154.1818 Certification of inhibition.

(a) Except as provided in § 154.1740(b), no person may operate a vessel carrying butadiene or vinyl chloride without carrying in the wheelhouse written certification from the shipper that the product is inhibited.

(b) The certification required by this section must contain the following information:

(1) The name and concentration of the inhibitor.

(2) The date the inhibitor was added.

(3) The expected duration of the inhibitor's effectiveness.

(4) Any temperature limitations qualifying the inhibitor's effective lifetime.

(5) The action to be taken if the time of the voyage exceeds the inhibitor's lifetime.

§ 154.1820 Shipping document.

No person may operate a vessel without carrying a shipping document in the wheelhoue that lists for each cargo on board:

(a) The cargo tank in which the cargo is stowed;

(b) The name of the shipper;

(c) The location of the loading terminal;

(d) The cargo name as listed in Table 4; and

(e) The approximate quantity of the cargo.

§ 154.1822 Shipping document: Copy for transfer terminal.

While a vessel is moored at a transfer terminal, the master shall ensure that at least one copy of the shipping document is given to the terminal's person in charge of cargo transfer.

§ 154.1824 Obstruction of pumproom ladderways.

The master shall ensure that each cargo pumproom access is unobstructed.

§ 154.1826 Opening of cargo tanks and cargo sampling.

(a) The master shall ensure that each cargo tank opening is fully closed at all times.

(b) The master may authorize the opening of a cargo tank:

(1) During tank cleaning; and

(2) To sample a cargo that Table 4 allows to be carried in a containment

system having a restricted gauging system if:

(i) The cargo tank is not being filled during sampling;

(ii) The vent system has relieved any pressure in the tank; and

(iii) The person sampling the cargo wears protective clothing.

(c) The master shall ensure that cargoes requiring closed gauging as listed in Table 4 are sampled only through the controlled sampling arrangement of the cargo tank.

§ 154.1828 Spaces containing cargo vapor: Entry.

(a) No person may enter a cargo handling space without the permission of the master or without following a safety procedure established by the master.

(b) Before allowing anyone to enter a cargo handling space, the master shall ensure that:

(1) The space is free of toxic vapors and has an oxygen concentration of at least 19.5 percent oxygen by volume; or

(2) Those entering the space wear protective equipment with breathing apparatus and an officer closely supervises the entire operation in the space.

§ 154.1830 Warning sign.

(a) The master shall ensure that a vessel transferring cargo, while fast to a dock or while at anchor in port, displays a warning sign:

(1) At the gangway facing the shore so that the sign may be seen from the shore; and

(2) Facing outboard towards the water so that the sign may be seen from the water.

(b) Except as provided in paragraph (e) of this section, each warning sign must have the following words:

(1) Warning.

(2) Dangerous Cargo.

(3) No Visitors.

(4) No Smoking.

(5) No Open Lights.

(c) Each letter in the words on the sign must:

(1) Be block style;

(2) Be black on a white background;

(3) Be 7.6 cm (3 in.) high;

(4) Be 5.1 cm (2 in.) wide, except for "M" and "W" which must be 7.6 cm (3 in.) wide, and the letter "I" which may be 1.3 cm (½ in.) wide; and

(5) Have 1.3 cm (½ in.) stroke width.

(d) The spacing between letters must be:

(1) 1.3 cm (½ in.) between letters of the same word on the sign;

(2) 5.1 cm (2 in.) between words;

(3) 5.1 cm (2 in.) between lines; and

(4) 5.1 cm (2 in.) at the borders of the sign.

(e) The words "No Smoking" and "No Open Lights" may be omitted when the cargoes on board a vessel are not flammable.

(f) When a vessel carries or transfers vinyl chloride, the warning sign under paragraph (b) of this section must also have the words "Cancer Suspect Agent."

§ 154.1831 Person in charge of cargo transfer.

Before cargo transfer operations are started, the master shall designate the person in charge of cargo transfer.

§ 154.1834 Cargo transfer piping.

The person in charge of cargo transfer shall ensure that cargo is transferred to or from a cargo tank only through the cargo piping system.

§ 154.1836 Vapor venting as a means of cargo tank pressure and temperature control.

When the vessel is on the navigable waters of the United States, the master shall ensure that the cargo pressure and temperature control system under §§ 154.701 through 154.709 is operating and that venting of cargo is unnecessary to maintain cargo temperature and pressure control, except under emergency conditions.

§ 154.1838 Discharge by gas pressurization.

The person in charge of cargo transfer may not authorize cargo discharge by gas pressurization unless:

(a) The tank to be offloaded is an independent tank type B or C;

(b) The pressurizing medium is the cargo vapor or a nonflammable, nontoxic gas that is inert with the cargo; and

(c) The pressurizing line has:

(1) A pressure reducing valve that has a setting that is 90 percent or less of the tank's relief valve setting; and

(2) A manual control valve between the pressure reducing valve and the tank.

§ 154.1840 Protective clothing.

The person in charge of cargo transfer shall ensure that each person involved in a cargo transfer operation, except those assigned to gas-safe cargo control rooms, wears protective clothing.

§ 154.1842 Cargo system: Controls and alarms.

The master shall ensure that the cargo emergency shut-down system and the alarms under § 154.1325 are tested and working before cargo is transferred.

§ 154.1844 Cargo tanks: Filling limits.

(a) Unless a higher limit is specified on the certificate the master shall ensure that a cargo tank is not loaded:

(1) More than 98 percent liquid full; or

(2) In excess of the volume determined under the following formula:

$$V_L = (0.98\ V)\left(\frac{d_r}{d_L}\right)$$

where:

V_L = maximum volume to which the tank may be loaded;

V = volume of the tank;

d_r = density at the reference temperature specified in paragraph (b) of this section; and

d_L = density of the cargo at the loading temperature and pressure.

(b) The reference temperature to be used in paragraph (a)(2) of this section is the temperature corresponding to the vapor pressure of the cargo at the set pressure of the pressure relief valves.

§ 154.1846 Relief valves: Changing set pressure.

The master shall:

(a) Supervise the changing of the set pressure of relief valves under § 154.802(b);

(b) Enter the change of set pressure in the vessel's log; and

(c) Ensure that a sign showing the set pressure is posted:

(1) In the cargo control room or station; and

(2) At each relief valve.

§ 154.1848 Inerting.

(a) The master shall ensure that:

(1) Hold and interbarrier spaces on a vessel with full secondary barriers are inerted so that the oxygen concentration is 8 percent or less by volume when flammable cargoes are carried;

(2) Hold and interbarrier spaces contain only dry air or inert gas on:

(i) A vessel with partial secondary barriers;

(ii) A vessel with full secondary barriers when non-flammable cargoes are carried; and

(iii) A vessel with refrigerated independent tanks type C;

(3) When cargo tanks containing flammable vapor are to be gas freed, the flammable vapors are purged from the tank by inert gas before air is admitted; and

(4) When gas free cargo tanks are to be filled with a flammable cargo, air is purged from the tank by inert gas until the oxygen concentration in the tank is 8 percent or less by volume before cargo liquid or vapor is introduced.

(b) Inert gas must be supplied from the shore or from the vessel's inert gas system.

§ 154.1850 Entering cargo handling spaces.

(a) The master shall ensure that the ventilation system under § 154.1200 is in operation for 30 minutes before a person enters one of the following:

(1) Spaces containing cargo pumps, compressors, and compressor motors.

(2) Gas-dangerous cargo control spaces.

(3) Other spaces containing cargo handling equipment.

(b) The master shall ensure that a warning sign listing the requirement for use of the ventilation system, is posted outside of each space under paragraph (a) of this section.

(c) The master shall ensure that no sources of ignition are put in a cargo handling space on a vessel carrying flammable cargo unless the space is gas free.

§ 154.1852 Air breathing equipment.

(a) The master shall ensure that a licensed officer inspects the compressed air breathing equipment at least once each month.

(b) The master shall enter in the vessel's log a record of the inspection required under paragraph (a) of this section that includes:

(1) The date of the inspection; and

(2) The condition of the equipment at the time of the inspection.

§ 154.1854 Methane (LNG) as fuel.

(a) If methane (LNG) vapors are used as fuel in the main propulsion system of a vessel, the master shall ensure that the fuel oil fired pilot under § 154.705(c) is used when the vessel is on the navigable waters of the United States.

(b) When the methane (LNG) fuel supply is shut down due to loss of ventilation or detection of gas, the master shall ensure that the methane (LNG) fuel supply is not used until the leak or other cause of the shutdown is found and corrected.

(c) The master shall ensure that the required procedure under paragraph (b) of this section is posted in the main machinery space.

(d) The master shall ensure that the oxygen concentration in the annular space of the fuel line under § 154.706(a)(1) is 8% or less by volume before methane (LNG) vapors are admitted to the fuel line.

§ 154.1858 Cargo hose.

The person in charge of cargo transfer shall ensure that cargo hose used for cargo transfer service meets §§ 154.552 through 154.562.

§ 154.1860 Integral tanks: Cargo colder than −10° C (14° F).

The master shall ensure that an integral tank does not carry a cargo colder than −10° C (14° F) unless that carriage is specially approved by the Commandant (G-MTH).

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

§ 154.1862 Posting of speed reduction.

If a speed reduction is specially approved by the Commandant under § 154.409, the master shall ensure that the speed reduction is posted in the wheelhouse.

§ 154.1864 Vessel speed within speed reduction.

The master shall ensure that the speed of the vessel is not greater than the posted speed reduction.

§ 154.1866 Cargo hose connection: Transferring cargo.

No person may transfer cargo through a cargo hose connection unless the connection has the remotely controlled quick closing shut off valve required under § 154.538.

§ 154.1868 Portable blowers in personnel access openings.

The master shall ensure that a portable blower in a personnel access opening does not reduce the area of the opening so that it does not meet § 154.340.

§ 154.1870 Bow and stern loading.

(a) When the bow or stern loading piping is not in use, the master shall lock closed the shut-off valves under § 154.355(a)(4) or remove the spool piece under § 154.355(a)(4).

(b) The person in charge of cargo transfer shall ensure that after the bow or stern loading piping is used it is purged of cargo vapors with inert gas.

(c) The person in charge of cargo transfer shall ensure that entrances, forced or natural ventilation intakes, exhausts, and other openings to any deck house alongside the bow or stern loading piping are closed when this piping is in use.

(d) The person in charge of cargo transfer shall ensure that bow or stern loading piping installed in the area of the accommodation, service, or control space is not used for transfer of the following:

(1) Acetaldehyde.
(2) Ammonia, anhydrous.
(3) Dimethylamine.
(4) Ethylamine.
(5) Ethyl Chloride.
(6) Methyl Chloride.
(7) Vinyl Chloride.

§ 154.1872 Cargo emergency jettisoning.

(a) The master shall ensure that emergency jettisoning piping under § 154.356, except bow and stern loading and discharging piping, is only used when an emergency exists.

(b) Emergency jettisoning piping when being used may be outside of the transverse tank location under § 154.310.

(c) The master shall ensure that cargo is not jettisoned in a U.S. port.

(d) When ethylene oxide is carried, the master shall ensure that the emergency jettisoning piping with associated pumps and fittings is on-line and ready for use for an emergency.

(e) The master shall lock closed the shut-off valves under § 154.356 when the emergency jettisoning piping is not in use.

(f) The person in charge of cargo transfer shall ensure that after the emergency jettisoning piping is used it is purged of cargo vapors with inert gas.

(g) The person in charge of cargo transfer shall ensure that entrances, forced or natural ventilation intakes, exhausts, and other openings to accommodation, service, or control spaces facing the emergency jettisoning piping area and alongside the emergency jettisoning piping are closed when this piping is in use.

TABLE 4—SUMMARY OF MINIMUM REQUIREMENTS

Cargo name[1]	Ship type	Independent tank type C required	Control of cargo tank vapor space	Vapor detection[2]	Gauging[3]	Electrical hazard class and group[4]	Special requirements
Acetaldehyde	IIG/IIPG		Inert	I & T	C	I–C	154.1410 (c), 154.1410, 154.1710, 154.1720, 154.1870
Ammonia, anhydrous.	IIG/IIPG			T	C	I–D	154.1000, 154.1400 (c), 154.1405, 154.1410, 154.1702 (b), (c), (e), 154.1760, 154.1870
Butadiene	IIG/IIPG		Inert	I	R	I–B	154.1702 (b), (d), (f), 154.1710, 154.1750, 154.1818.
Butane	IIG/IIPG			I	R	I–D	None.
Butylene	IIG/IIPG			I	R	I–D	None.
Dimethylamine	IIG/IIPG			I & T	C	I–C	154.1400 (c), 154.1405, 154.1410, 154.1702 (b), (c), (e), 154.1870.
Ethane	IIG			I	R	I–D	None.
Ethylamine	IIG/IIPG			I & T	C	I–C	154.1400 (c), 154.1405, 154.1410, 154.1702 (b), (c), (e), 154.1870.
Ethyl Chloride	IIG/IIPG			I & T	R	I–D	154.1870.
Ethylene	IIG			I	R	I–C	None.
Ethylene oxide	IG	Yes	Inert	I & T	C	I–B	154.660 (b) (3), 154.1400 (c), 154.1405, 154.1410, 154.1702 (b), (d), (f), 154.1705, 154.1710, 154.1720, 154.1725, 154.1730, 154.1870 (a), (b).
Methane (LNG)	IIG			I	C	I–D	154.703 through 154.709, 154.1854.
Methyl acetylene-propadiene mixture.	IIG/IIPG			I	R	I	154.1735.

TABLE 4—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name[1]	Ship type	Independent tank type C required	Control of cargo tank vapor space	Vapor detection[2]	Gauging[3]	Electrical hazard class and group[4]	Special requirements
Methyl bromide	IG	Yes		I & T	C	I–D	154.660 (b) (3), 154.1345 (c) (d), 154.1400 (c), 154.1405, 154.1410, 154.1702 (a), (d), 154.1705, 154.1720, 154.1870 (a), (b).
Methyl chloride	IIG/IIPG			I & T	C	I–D	154.1702 (a), 154.1870.
Nitrogen	IIIG			O	C		154.1755.
Propane	IIG/IIPG			I	R	I–D	None.
Propylene	IIG/IIPG			I	R	I–D	None.
Refrigerant	IIIG				R		None.
Sulfur dioxide	IG	Yes	Dry	T	C		154.660 (b) (3), 154.1345 (c), (d), 154.1400 (c), 154.1405, 154.1410, 154.1705, 154.1715, 154.1720, 154.1870 (a), (b).

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TABLE 4—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo name[1]	Ship type	Independent tank type C required	Control of cargo tank vapor space	Vapor detection[2]	Gauging[3]	Electrical hazard class and group[4]	Special requirements
Vinyl chloride	IIG/IIPG			I & T	C	I-D	154.1405, 154.1410, 154.1702 (a) (b) (d) (f), 154.1710, 154.1740, 154.1745, 154.1750, 154.1818, 154.1830 (f), 154.1870

[1] Refrigerant gases include non-toxic, non-flammable gases such as: dichlorodifluoromethane, dichloromonofluoromethane, dichlorotetrafluoroethane, monochlorodifluoromethane, monochlorotetrafluoroethane, and monochlorotrifluoromethane.

[2] As used in this column: "I" stands for flammable vapor detection; "T" stands for toxic vapor detection; "O" stands for oxygen detection; and see §§ 154.1345 thru 154.1360.

[3] As used in this column: "C" stands for closed gauging; "R" stands for restricted gauging; and see § 154.1300.

[4] The designations used in this column are from the National Electrical Code.

[CGD 74-289, 44 FR 26009, May 3, 1979; 44 FR 59234, Oct. 15, 1979]

APPENDIX A—EQUIVALENT STRESS

I. Equivalent stress (σc) is calculated by the following formula or another formula specially approved by the Commandant (G-MTH) as equivalent to the following:

$$\sigma_c = \sqrt{\sigma_x^2 + \sigma_y^2 - \sigma_x\sigma_y + 3\tau_{xy}^2}$$

where:

σ_x=total normal stress in "x" direction.

σ_y=total normal stress in "y" direction.

τ_{xy}=total shear stress in "xy" plane.

II. When the static and dynamic stresses are calculated separately, the total stresses in paragraph I are calculated from the following formulae or another formulae specially approved by the Commandant (G-MTH) as equivalent to the following:

$$\sigma_x = \sigma_x(\text{static}) \pm \sqrt{\sum(\sigma_x(\text{dynamic}))^2}$$

$$\sigma_y = \sigma_y(\text{static}) \pm \sqrt{\sum(\sigma_y(\text{dynamic}))^2}$$

$$\tau_{xy} = \tau_{xy}(\text{static}) \pm \sqrt{\sum(\tau_{xy}(\text{dynamic}))^2}$$

III. Each dynamic and static stress is determined from its acceleration component and its hull strain component from hull deflection and torsion.

[CGD 74-289, 44 FR 26009, May 3, 1979, as amended by CGD 82-063b, 48 FR 4782, Feb. 3, 1983]

APPENDIX B—STRESS ANALYSES DEFINITIONS

The following are the standard definitions of stresses for the analysis of an independent tank type B:

"Normal stress" means the component of stress normal to the plane of reference.

"Membrane stress" means the component of normal stress that is uniformly distributed and equal to the average value of the stress across the thickness of the section under consideration.

"Bending stress" means the variable stress across the thickness of the section under consideration, after the subtraction of the membrane stress.

"Shear stress" means the component of the stress acting in the plane of reference.

"Primary stress" means the stress produced by the imposed loading that is necessary to balance the external forces and moments. (The basic characteristic of a primary stress is that it is not self-limiting. Primary stresses that considerably exceed the yield strength result in failure or at least in gross deformations.)

"Primary general membrane stress" means the primary membrane stress that is so distributed in the structure that no redistribution of load occurs as a result of yielding.

"Primary local membrane stress" means the resulting stress from both a membrane stress, caused by pressure or other mechanical loading, and a primary or a discontinuity effect that produces excessive distortion in the transfer of loads to other portions of the structure. (The resulting stress is a primary local membrane stress although it has some characteristics of a secondary stress.) A stress region is local if:

$$S_1 \le 0.5\sqrt{Rt}; \text{ and}$$

$$S_2 \le 2.5\sqrt{Rt}$$

Where:

S_1=distance in the meridional direction over which the equivalent stress exceeds 1.1 f.

S_2=distance in the meridional direction to another region where the limits for primary general membrane stress are exceeded.

R=mean radius of the vessel.

t=wall thickness of the vessel at the location where the primary general membrane stress limit is exceeded.

f=allowable primary general membrane stress.

"Secondary stress" means a normal stress or shear stress caused by constraints of adjacent parts or by self-constraint of a structure. The basic characteristic of a secondary stress is that it is self-limiting. Local yielding and minor distortions can satisfy the conditions that cause the stress to occur.

ART 154a—SPECIAL INTERIM REGULATIONS FOR ISSUANCE OF LETTERS OF COMPLIANCE TO BARGES AND EXISTING LIQUEFIED GAS VESSELS

1. General.
2. Background.
3. Discussion.
4. Action.

Annex A—Bulk liquid cargoes considered to involve potential unusual operating risks to life and property in U.S. ports.

Annex B—Bulk liquid cargoes not considered to involve potential unusual operating risks to life and property in U.S. ports.

Authority: 46 U.S.C. 3703; 49 CFR 1.46.

Editorial Note: Nomenclature changes to art 154a appear at CGD 82-072, 47 FR 8676, July 1, 1982.

1. *General.*

(a) *Applicability*—The regulations in this art apply to foreign flag vessels that:

(1) Are barges that have onboard any of e products listed in Table 1 of Annex A to is part, as cargo, cargo residue, or vapor;

2) Are self-propelled vessels that:

(i) Have onboard any of the products listed in Table 4 of 46 CFR Part 154 as cargo, cargo residue, or vapor; and

(ii) Are not regulated under Parts 153 or 154 of this chapter.

(b) *Purpose.* This interim regulation prescribes procedures for the issuance of a Letter of Compliance to foreign flag barges and liquefied gas vessels carrying certain bulk dangerous cargoes which create potential unusual operating risks to life and property in U.S. ports. These unusual operating risks may be by virtue of the vessel design, the vessel operation or the cargoes carried.

A Letter of Compliance, valid for a period of not more than 2 years, is issued to vessels upon satisfactory completion of plan review and examination. Reissuance of a vessel's Letter of Compliance requires a satisfactory Coast Guard reexamination.

2. *Background.* Prior to 1965, the carriage of dangerous cargoes by water was minimals, with foreign vessels being allowed entry without regard to technical requirements for the safety and security of U.S. ports. With the expansion of the chemical industry and chemical shipments by water, the carriage of certain dangerous cargoes was determined to present potential unusual operating risks to U.S. ports. Since there was no recognized international standard for the design and construction of the cargo containment portion of vessels, the United States promulgated regulations permitting some control for the assurance of port safety.

Under the provisions of 46 CFR 2.01-13, foreign vessels involving novel features of design or construction upon which the Convention for the Safety of Life at Sea is silent, or which involve potential unusual operating risks, are subject to inspection to the extent necessary to safeguard life and property in U.S. ports. The control and movement of such vessels in U.S. waters are also subject to the jurisdiction of the U.S. Coast Guard captain of the port pursuant to the authority of 33 CFR, Part 6 and in accordance with 33 CFR, Part 124. Foreign vessel operators were informed of requirements and procedures by "Navigation and Vessel Inspection," Circular No. 13-65 dated September 30, 1965.

The complex nature of U.S. regulations has made them very difficult for foreign operators to use and understand. Requirements for the review of cargo containment portions of vessels are found in various subparts of Subchapter D (Tank Vessel Regulations), Subchapter F (Marine Engineering Regulations), Subchapter J (Electrical Regulations), Subchapter I (Cargo and Miscellaneous Vessel Regulations), and Subchapter O (Certain Bulk Dangerous Cargo Regulations).

It has been found necessary to promulgate interim regulations to explain to foreign vessel owners the present submission procedure for the review of the cargo containment portions of their vessels. These interim regulations will also provide reference to the U.S. regulations that apply to the cargo containment portion of such vessels.

3. *Discussion*—(a) *Unusual risks.* A potential unusual operating risk may exist because of the design of the vessel, the cargoes carried, the method of handling the cargo, or any unconventional shipboard system. A "design" is not considered restricted to construction details, but is considered to include the overall concept of the carriage of the cargo. For example, a vessel designed for the low temperature carriage of cargoes creates an unusual risk because the uncontrolled release of cargo can cause brittle fracture of the surrounding structure. Also, a vessel of conventional design could pose a hazard when carrying a product not considered when the vessel was built. Additionally, a new or unusual handling technique for a common product could create a hazard.

In considering safeguards necessary to permit the movement of these cargoes in bulk, all aspects of the overall transportation concept must be considered. This includes intended routes, navigational considerations, vessel design features, method of cargo handling, and the shore facilities available.

(b) *Cargoes considered to involve unusual risks.* (1) Types of cargoes which are considered to involve potential unusual operating risks include:

(i) Highly reactive or unstable commodities;

(ii) Commodities having severe and unusual fire hazards, such as liquefied flammable gases;

(iii) Commodities having toxic properties;

(iv) Commodities requiring refrigeration or pressurization for their safe containment;

(v) Commodities which can cause brittle fracture of normal temperature materials by reason of their being carried at low temperature or because of their low boiling point at atmospheric pressure;

(vi) Corrosive commodities.

(2) The cargoes which have been determined to meet the above criteria are listed in annex A. Foreign vessels loading, discharging, or carrying these cargoes in U.S. ports require a letter of compliance.

(3) Cargoes considered not to involve potential unusual operating risks in bulk transportation are found in annex B. Vessels loading, discharging, or carrying only those cargoes listed in annex B are not subject to the procedures explained herein.

(4) Any cargo which is intended for carriage and which does not appear in either annex A or annex B is subject to an individual determination by the Commandant (GMTH). The shipper must first notify the Coast Guard of his intention to carry any such cargo. Based on a review of the cargo's hazards, it will be assigned to either annex A or annex B. Requirements will be developed for a cargo assigned to annex A and the vessel will then be reviewed on the basis of those requirements.

(c) *Features of interest to the Coast Guard.* The following are examples of the type of features in which the Coast Guard is interested from the point of view of safety of life and property in U.S. ports:

(1) Design and arrangement of cargo tanks and cargo piping and vent systems. (Including the suitability of the cargo containment system materials for the pressure and temperatures involved, welder and welding procedure qualification, and nondestructive testing of the cargo tanks and piping.)

(2) Arrangement and adequacy of installed fire extinguishing system and equipment.

(3) Safety devices and related systems which check the cargo and the surrounding spaces to give warning of leaks or other disorders which could result in a casualty.

(4) Isolation of toxic cargoes.

(5) Compatibility of one cargo with another and with the materials of the containment system.

(6) Suitability of electrical equipment installed in hazardous areas.

4. *Action*—(a) *Foreign vessel owner.* (1) Owners desiring to carry cargoes which exhibit a potential unusual operating risk to U.S. ports must submit a formal request to the Commandant (GMTH) for a review of the cargo containment portion of the vessel. This request must include:

(i) A list of all cargoes to be carried which do not appear in the list in annex B.

(ii) The anticipated routes of the vessel.

(iii) Country of vessel registry.

(iv) Classification society.

(v) A description of the cargo containment system.

(2) Plan review information must be submitted as specified in annex A.

(i) Required information must be submitted in the English language and received at least 90 days prior to desired entry into U.S. ports.

(3) Owners and charterers should consider that vessels which have not completed plan review, and which arrive at a U.S. port with cargo on board requiring a letter of compliance, will be ordered to depart U.S. territorial waters until outstanding review items and vessel discrepancies have been resolved. Furthermore, vessels arriving at a U.S. port in an empty condition will not be permitted to load cargo requiring a letter of compliance until plan review and initial examination are satisfactorily completed.

(b) *Plan Review—U.S. Coast Guard.*

(1) The required plans and specifications are reviewed using criteria equivalent to those used in the review of a similar design for U.S. registry. Review of self-propelled liquefied gas vessels is based upon those plans required in Annex A of this part and the requirements of Part 38 of this chapter. Review of barges is based upon the plans required in Annex A and the requirements of Part 151 of this chapter.

(i) Review of existing vessels will be based upon those plans required for individual cargoes as specified in annex A. For cargoes not previously requiring a letter of compliance, consideration will be given to standards in effect at the time of construction in order that major modifications to the cargo containment portion of the vessel would not be required.

(ii) Plan review for new construction will be considered complete after plans, specifications, and inspection and test reports have been found satisfactory and evidence has been received that the vessel will be accepted by a recognized classification society. Normally, when foreign equipment and material standards provide the same degree of safety as comparable U.S. standards, they will be accepted in lieu of requiring approved items of equipment and materials from U.S. manufacturers.

(2) Arrangements have been made with certain classification societies to further streamline the plan review of various systems, components, and test data for liquefied flammable gas vessels. These procedures may be used if desired. Because the arrangements differ from society to society, specific details should be obtained directly from the society classing the vessel.

(3) Instead of initially submitting plans and drawings, the vessel's owner may submit the vessel's IMO Certificate of Fitness issued by the flag administration under:

(i) The "IMO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk," adopted without amendments by Assembly Resolution A.328(IX);

(ii) The "IMO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk," adopted without amendments by Assembly Resolution A.328(IX) in accordance with IMO Resolution A.329(IX);

(iii) The "IMO Code for Existing Snips Carrying Liquefied Gases in Bulk." Following Coast Guard review of the IMO Certificate of Fitness, the owner is advised of any additional plans and drawings needed for review.

(4) The Coast Guard does not conduct examinations in foreign building yards for the purpose of issuance of letters of compliance. For vessels under construction or alteration, it is the responsibility of the vessel owner to incorporate all requirements made by the Coast Guard during plan review. Required reports of examinations or tests must be certified by the vessel's classification society. The owner must make arrangements with the classification society for the examination and submission of the English copies of the reports and certificates. All submissions should be sent from one central agency, the owner or owner's representative, rather than directly from all manufacturers involved in construction.

(5) Upon completion of plan review, the Commandant (G-MTH) notifies the owner that plan review is complete and specifies the cargoes authorized for carriage and the applicable restrictions.

(c) *Notification of arrival.*

After receiving notification from the Commandant (G-MTH) that plan review is complete, the owner may send his vessel to a U.S. port for examination. To arrange for the examination, the owner or charterer must notify the Commandant (G-MTH) in writing of the vessel's initial arrival, stating:

(1) The expected date of the vessel's arrival in U.S. waters;

(2) The port of call of the vessel;

(3) The vessel's agent in that port of call; and

(4) Any cargoes the vessel is to carry.

This notification of arrival must be made at least 14 days before the vessel's date of arrival. Late notification may cause the vessel's examination and schedules cargo operation to be delayed.

(d) *Examination*—(1) *Initial examination.* (i) Upon arrival at the first port of call in the United States, representatives of the cognizant captain of the port and officer in charge, marine inspection, will board the vessel. The Commandant may deem it necessary to have a headquarters representative attend as a member of the boarding party because of peculiarities in vessel design, cargo handling operations, or hazardous properties of the cargo.

(ii) For those vessels that have completed Coast Guard plan review, the boarding party will examine the vessel's arrangement and cargo system, including tanks, piping, machinery, and alarms. In addition, the boarding party will observe the material condition of the vessel, vessel operation, cargo handling operations, firefighting capability, and personnel performance. Cargo tanks will not be required to be gas free unless prior notification is given the owner by Commandant (GMTH).

(iii) For those vessels that have an IMO Certificate of Fitness, accepted by the Coast Guard under Paragraph 4(b)(3), a copy of the IMO Certificate in English or French must be available for examination by the boarding party. The boarding party will examine and observe the material condition of the vessel, vessel operation, cargo handling operations, vessel firefighting capability, and personnel performance.

(iv) Serious discrepancies, such as those involving inoperative safety equipment, leaking cargo piping or nonexplosion-proof electrical installations may require immediate correction prior to cargo transfer operations. Minor discrepancies may not preclude permission to transfer cargo, but may require correction prior to a second call in a U.S. port either on the initial voyage or on a subsequent voyage.

(2) *Reexamination.* (i) Reexaminations are conducted biennially for vessels which hold a Coast Guard letter of compliance. The purpose of reexaminations is to insure that the vessel is being maintained to the safety and construction standards as initially examined. Vessels with letters of compliance issued prior to 1972 must be reexamined within 1 year of the date of these regulations. Vessels which have not been reexamined under the provisions outlined above will be denied the privileges afforded by the vessel's letter of compliance.

(ii) The vessel owner or charterer must make arrangements for a letter of compliance reexamination in accordance with paragraph 4(c), as he did for the initial examination.

(iii) The boarding party will examine and observe the material condition of the vessel, vessel operation, cargo handling operations, condition of firefighting and safety equipment, and personnel performance.

(iv) Paragraph 4(d)(1)(iv) outlines the procedures applying to vessel discrepancies found during reexaminations.

(3) *Boardings.* (i) The condition of the vessel during subsequent arrivals in U.S. ports must be maintained to those standards set for the initial examination. Vessels may be boarded at the harbor entrance, and while en route to berth, underway tests and examinations of the firefighting equipment, leak detectors, quick closing valves, and other safety equipment may be conducted. Inoperative equipment may result in the vessel not being permitted to enter port or to conduct cargo operations. Failure of the owner to maintain the vessel to the general safety and construction standards, or reports by Coast Guard field units of improper or negligent cargo handling operations, as well as unreported modifications to the cargo system, may invalidate the letter of compliance. Reinstatement would be dependent upon evidence that the deficient equipment or cargo handling procedures were corrected to insure safe handling of applicable cargoes.

(e) *Master of vessel.* (1) The master of the vessel must have all required SOLAS certificates and vessel plans required under these regulations available for the boarding party to use when examining the vessel. Vessel plans, in English, must include, but not be limited to, general cargo tank arrangement, cargo tank venting arrangement, cargo piping arrangements, and safety plans. Evidence of the set pressure of the safety relief valves must be available, preferably in the form of a classification society certificate. The master may be called upon to verify the set pressures stated on the certificate. For those vessels which have completed Coast Guard plan review, the plans provided should be duplicates of plans submitted to the Coast Guard. For those vessels that have an IMO Certificate of Fitness, accepted by the Coast Guard under Paragraph 4(b)(3), a copy of the certificate, in English or French, must be presented.

(f) *Letter of compliance.* (1) If the vessel meets all applicable requirements of these regulations, a Letter of Compliance is issued by the Coast Guard. The Letter of Compliance must be available for presentation to Coast Guard inspection parties whenever the vessel is boarded by Coast Guard personnel. The letter will indicate that the special cargo carrying and handling features of the vessel have been evaluated and found satisfactory for the cargoes specified. For subsequent vessel arrivals, the Captain of the Port, in conjunction with the Officer in Charge, Marine Inspection, will make such reexamination as he considers necessary to insure that the vessel has been maintained as initially examined. This will be in addition to the regular biennial reexamination. Vessels which have a Letter of Compliance issued on the basis of an IMO Code certification must maintain a valid certificate and provide the Commandant (G-MTH) with amendments to and updated copies of the certificate, whenever issued by the flag administration.

Changes of vessel name, vessel owner, vessel registry and modifications to the vessel's cargo containment system terminates the Letter of Compliance and must be reported to the Commandant (G-MTH). Upon completion of a satisfactory reexamination, a revised Letter of Compliance will be issued.

(g) *Cargo loading.* (1) A loading diagram indicating all cargoes to be carried, loaded, or unloaded in U.S. ports must be available for captain of the port personnel at all ports of call in the United States. This loading diagram is in addition to, and not in place of the information required by 33 CFR Part 124.

(2) Cargo compatibility must be considered in preparing a loading diagram and in the subsequent cargo transfer operations. Proper safeguards against accidental mixing of reactive products would include consideration of such factors as avoidance of the use of common cargo and vent lines and carriage in adjacent tanks having a common bulkhead. The current compatibility guide

entitled "Bulk Liquid Cargoes: Guide to Compatibility of Chemicals," should be consulted when determining the compatability of chemicals. A copy of the compatibility guide is enclosed with the Letter of Compliance when issued. Additional copies are available from the Commandant (G-MTH) upon request.

ANNEX A

BULK LIQUID CARGOES CONSIDERED TO INVOLVE POTENTIAL UNUSUAL OPERATING RISKS TO LIFE AND PROPERTY IN U.S. PORTS

1. Vessels transporting the following commodities in bulk require plan review and examination in accordance with these interim regulations. The submissions to be reviewed will depend upon the cargoes to be carried. These submissions are referenced in Table I of this annex.

TABLE I

Cargo	*For submissions, see paragraphs*
Acetaldehyde	3, 4, 7, 13.
Acetic acid	3, 7, 8, 9.
Acetic anhydride	3, 7, 8, 9.
Acetone cyanohydrin (stabilized).	
Acetonitrile	3, 7, 8, 9, 10, 11.
Acrolein	3, 7, 8, 10, 11, 13.
Acrylic acid (inhibited)	3, 7, 9.
Acrylonitrile (inhibited)	3, 7, 8, 9, 10, 11.
Adiponitrile	3, 7, 8.
Allyl alcohol	3, 7, 8, 10, 11.
Allyl chloride	3, 7, 8, 10, 11.
Aminoethylethanolamine	3, 7, 9.
Ammonia, anhydrous	3, 4, 5, 6, 7, 8.
Ammonium hydroxide (not to exceed 28% NH_3).	3, 7, 8, 9.
Aniline	3, 7, 8, 10, 11.
Benzene	3, 7, 8, 10, 11.
Benzene, toluene, xylene (crude).	3, 7.
Butadiene (inhibited)	3, 4, 5, 6, 7, 8.
Butane	3, 4, 5, 6, 7, 8.
Butene	3, 4, 5, 6, 7, 8.
Butyl acrylate (iso-, n-) (inhibited).	3, 7, 8.
Butylamine (iso-, n-, sec-, tert-)	3, 7, 9.
Butylene oxide	3, 7, 8, 9, 13.
Butyraldehyde (iso-, n-) (crude).	3, 7, 8.
Camphor oil	3, 7, 8.
Carbolic oil	3, 7, 8, 10, 11.
Carbon bisulfide	3, 8, 13, 14.
Carbon tetrachloride	3, 8, 10, 11.
Caustic potash solution	3, 9.
Caustic soda solution	3, 9.
Chlorobenzene	3, 7, 8.
Chloroform	3, 7, 8, 10, 11.
Chlorohydrins (crude)	3, 7, 8, 10, 11.
Chlorosulfonic acid	3, 8, 10, 11, 12.
Cresols (mixed isomers)	3, 7.
Crotonaldehyde	3, 7, 8, 10, 11.
Cyclohexanone	3, 7.
Decyl acrylate (inhibited) (iso-)	3, 7.
Dibutylamine	3, 7, 9.
Dichlorobenzene (ortho-)	3, 7, 9.
Dichlorodifluoromethane	3, 4, 6.
Dichloroethyl ether	3, 7, 9.
1,2-dichloropropene	3, 7, 8, 10, 11.
Dichloropropene	3, 7, 8, 10, 11.
Diethanolamine	3, 7, 9.
Diethylamine	3, 7, 9.
Diethylenetriamine	3, 7, 9.
Diisopropanolamine	3, 7, 9.
Diisopropylamine	3, 7, 9, 10, 11.
Dimethylamine	3, 4, 5, 7, 8.
Dimethylformamide	3, 7, 8, 9.
1,4-dioxane	3, 7.
Diphenyl methane diisocyanate	3, 7, 9, 10, 11, 13.
Epichlorohydrin	3, 7, 8, 10, 11.
Ethane	3, 4, 5, 6, 7, 8.
Ethyl acrylate (inhibited)	3, 7, 8.
Ethylamine	3, 4, 7, 8, 13.
Ethyl chloride	3, 4, 7, 8.
Ethylene	3, 4, 5, 6, 7, 8.
Ethylene cyanohydrin	3, 7.
Ethylenediamine	3, 7, 8, 9.
Ethylene dibromide	3, 8, 10, 11.
Ethylene dichloride	3, 7, 8.
Ethylenimine	3, 7, 8, 9, 10, 11, 13.
Ethylene oxide	3, 4, 5, 7, 8, 11, 13.
Ethyl ether	3, 7, 8, 9, 13.
2-ethylhexyl acrylate (inhibited)	3, 7.
2-ethyl-3-propyl acrolein	3, 7, 8.
Formaldehyde solution (37-50%)	3, 7, 8.
Formic acid	3, 7, 8, 9.
Furfural	3, 7, 8, 9.
Hydrochloric acid	3, 8, 12.
Hydrofluoric acid	3, 8, 12.
Hydrogen chloride	3, 4, 6, 8.
Hydrogen fluoride	3, 4, 8.
2-hydroxyethyl acrylate (inhibited).	3, 7, 8, 10, 11.
Isoprene (inhibited)	3, 7, 8.
Methane	3, 4, 5, 6, 7, 8.
Methyl acetylene propadiene (mixture) (stabilized).	3, 4, 5, 6, 7, 8.
Methyl acrylate (inhibited)	3, 7, 8.
Methyl bromide	3, 4, 7, 10, 11.
Methyl chloride	3, 4, 5, 6, 7, 8.
Methylcyclopentadienyl manganese tricarbonyl.	3, 7, 8, 10, 11.
2-methyl-5-ethyl pyridine	3, 7, 9.
Methyl methacrylate (inhibited)	3, 7, 8.
Monochlorodifluoromethane	3, 4, 6.
Monoethanolamine	3, 7, 8, 9.
Monoisopropanolamine	3, 7, 8, 9.
Morpholine	3, 7, 8, 9.
Motor fuel antiknock compounds containing lead alkyls.	3, 7, 8, 10, 11.
Nitric acid	3, 8, 12.
Nitrobenzene	3, 7, 10, 11.
2-nitropropane	3, 7.
Nonyl phenol sulfide	3, 7.
Oleum	3, 8, 12.
Phenol	3, 7, 8, 10, 11.
Phosphoric acid	3, 12.
Phosphorus (elemental)	3, 10, 11.
Phthalic anhydride (molten)	3, 7.
Polymethylene polyphenyl isocyanate	3, 7, 9, 13.
Propane	3, 4, 5, 6, 7, 8.
Propiolactone	3, 7, 10, 11.
Propionic acid	3, 7, 8, 9.
Propionic anhydride	3, 7, 9.
Propylamine (iso-)	3, 7, 9, 10, 11, 13.
Propylene	3, 4, 5, 6, 7, 8.
Propylene oxide	3, 7, 8, 9, 11, 13.
Pyridine	3, 7, 8, 9.
Styrene (inhibited)	3, 7, 8, 9.
Sulfur (molten)	3, 7, 8.
Sulfuric acid (includes spent)	3, 12.

TABLE I—Continued

Cargo	*For submissions, see paragraphs*
Tetraethylene pentamine	3, 7, 9.
Toluene diisocyanate	3, 7, 8, 9, 10, 11, 13.
Triethanolamine	3, 7, 9.
Triethylamine	3, 7, 9.
Triethylene tetramine	3, 7, 9.
Vinyl acetate (inhibited)	3, 7, 8, 9.
Vinyl chloride (inhibited)	3, 4, 5, 6, 7, 8.
Vinylidene chloride (inhibited)	3, 7, 8, 9, 13.
Vinyl toluene (meta-, para-) (inhibited)	3, 7, 9.

2. The information (plans, specifications, certificates, etc.) described in the following paragraphs is required for the plan review of a vessel. Such information is intended as a guide to cover the required information for both liquid gas carriers and certain chemical carriers. Depending upon the service and design of a particular vessel, the Coast Guard may require more information than is included on the list. All information should be submitted in duplicate by the owner or builder of the vessel. The Coast Guard will retain one copy of the information. All information must be translated into English and supplied from one control agency, the owner, or the owner's representative rather than directly from all the manufacturers involved in construction.

Mail information to:

Commandant (G-MTH), U.S. Coast Guard
2100 Second Street, SW.
Washington, D.C. 20593-0001.

Detailed Coast Guard regulations for U.S.-flag vessels are contained in the Code of Federal Regulations, 46 CFR 1-65, 46 CFR 66-145, and 46 CFR 150-199. These volumes are revised each year and may be purchased from:

The Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

NOTE: Special requirements for low-temperature operation (below 0° F) are contained in subchapter F of title 46, Code of Federal Regulations. These requirements incorporate those of NVC 6-67, which has been withdrawn. The applicable sections are as follows:

(1) Materials for low temperature operation: 46 CFR 54.25-10, 54.25-15, and 54.25-20.

(2) Toughness testing for low-temperature operation: 46 CFR 54.03 and 54.05.

(3) Welding for low-temperature operation: 46 CFR 57.02.

(a) Procedure qualification: 46 CFR 57.03 and 54.05.

(b) Production testing: 46 CFR 57.06 and 54.05.

(4) Low temperature piping: 46 CFR 56.50-105.

(a) Flange joints: 46 CFR 56.30-10.

(b) Welding: 46 CFR 56.70-15.

3. The owner, or owner's representative, of vessels intended to carry cargoes listed in this annex must submit the following:

(a) Written description of the vessel including general design features, cargoes to be carried, design conditions of cargo carriage registry and classification.

(b)(1) General arrangement;

(2) Inboard and outboard profiles;

(3) Midship sections.

(c) Venting (tanks and holds).

(1) Pressure and vacuum setting for pressure vacuum valves;

(2) Calculations which show the required capacity for safety relief valves or pressure relief valves;

(3) Description of means of cargo tank vacuum protection; and

(4) Arrangement of vent piping to atmosphere (including relief valves in pipe runs and flame screen specifications).

(d) Cargo handling.

(1) Cargo piping diagram;

(2) Arrangement of cargo piping on deck and in the tanks;

(3) Arrangement of machinery in motor, compressor, and control rooms;

(4) Piping diagram of reliquefaction/refrigeration system (if installed);

(5) Reliquefaction/refrigeration system components and materials (if installed);

(6) Operations manual for cargo handling system.

(e) Cargo tank gaging systems—liquid level, temperature, and pressure.

(f) Safety plan.

(g) Detailed plans of the fire protection systems serving cargo handling areas and other spaces of unusual hazard.

4. For vessels intended to carry cargoes listed in this annex which reference paragraph 4, the owner or owner's representative must submit:

(a) Base materials.

(1) Translated copies of specifications for all grades of material used in the cargo tanks and hull structure other than normal hull quality steel. Copies of specifications for materials conforming to American Society for Testing and Materials (ASTM) or American Bureau of Shipping (ABS) standards need not be submitted.

(2) Mill certificates or classification society certificates which show the chemistry and the mechanical properties including impact testing, where necessary for all base materials used in actual construction of cargo tanks.

(b) Cargo tanks.

(1) Design—pressure vessel-type tanks.

(i) Plans which show tank configuration, scantlings, and details of weld joints which specify type and extent of stress relief and nondestructive testing.

(ii) Details of all nozzles, domes, attachments, and penetrations into tanks.

(iii) Calculations which show the tanks meet Coast Guard requirements with regard to design, stresses, reinforcement, etc.

(iv) Calculations which show the effect of hull deflection on the stress level in any tanks supported by three or more saddles.

(2) Welding procedure.

(i) Procedure qualification, including test results.

(ii) Classification society certification that all welders have passed to society's performance qualification test.

(iii) Production test schedule.

(iv) Results of production testing.

(c) Venting (tanks and holds).

(1) Description of safety relief valves including design, materials, etc., and the results of a flow test indicating the actual capacity of a prototype valve.

(2) Description of means of pressure control or ventilation of hold spaces.

(d) Cargo handling system.

(1) Materials and components.

(i) Cargo pumps.

(ii) Translated copies of specifications for all grades of material used for piping, valves, fittings, flanges, bolting, etc. Copies of specifications for materials conforming to American Society for Testing and Materials (ASTM) or American Bureau of Shipping (ABS) standards need not be submitted.

(iii) Plans which show the installation of insulating materials for the cargo handling and containment systems (identify the composition of the materials).

5. For vessels intended to carry cargoes listed in this annex which reference paragraph 5, the owner or owner's representative must submit:

(a) Cargo handling system.

(1) Remotely operated valve actuation diagram, including means of actuation and source of power.

(2) Description of inert gas system and details of automatic controls.

(3) Arrangement for emergency discharge of cargo from tanks.

(b) If applicable, arrangement drawings and materials lists of installations for burning LNG boiloff in the propulsion boilers or engines.

6. For vessels intended to carry cargoes listed in this annex which reference paragraph 6, the owner or owner's representative must submit:

(a) Sections in way of cargo holds.

NOTE: These drawings should show the distribution of various grades of steel in the hull structure and secondary barrier. The steel distribution should be clearly shown by contrasting color or by other easily visible means. (Not normally required for ships with full pressure vessel cargo tanks.)

(b) Base materials.

(1) Mill certificates or classification society certificates which show the chemistry and the mechanical properties including impact testing for all base materials used in actual construction of cargo tanks, secondary barrier, and contiguous hull structure.

(c) Cargo tanks.

(1) Design—gravity tanks.

(i) Proposed prototype test program for tank designs which are not structurally self-supporting.

(ii) Plans which show the scantlings approved by the classification society.

(iii) Extent of nondestructive testing.

(iv) Details of cargo tank supports.

(d) Cargo handling system.

(1) Materials and components.

(i) Expansion joints, including cyclic test data.

(ii) Process pressure vessels (see item 4b (1)).

(iii) Mill certificates or classification society certificates which show the chemistry and the mechanical properties including impact testing for all such material used in actual construction.

(iv) Pipe welding procedures (procedure and welder qualification).

(v) Details of pipe scantlings, flange details, weld joint details, nondestructive testing, and post weld heat treatment.

(2) Method of removing water or leaked cargo from secondary barrier or hold space.

7. For vessels intended to carry cargoes listed in this annex which reference paragraph 7, the owner, or the owner's representative, must submit:

(a) General arrangement drawings with the hazardous areas indicated. The drawing must show the location of all electrical equipment, gas locks, and gas tight seals within the hazardous areas.

(b) A list of all electrical equipment installed in hazardous locations. This list must correspond to the general arrangement drawing and shall give the following information for each piece of equipment:

(1) Location;

(2) Whether intrinsically safe or explosion-proof;

(3) Manufacturer and manufacturer's model number;

(c) Details of shaft seals for gas tight bulkhead penetrations.

(d) Details of ventilation fans in hazardous locations.

(e) From the cognizant classification society, in triplicate, certification that the following items are in accordance with the society's rules and regulations:

(1) Certification that the equipment installed in the hazardous areas is explosionproof or intrinsically safe and is suitable for use with the intended cargoes. This should include explosionproof cable seal fittings.

NOTE: For certain hazardous locations, such as cargo pumprooms, intrinsically safe equipment only is acceptable, except for explosionproof lighting.

(2) Certification that the electrical installation in hazardous locations is in accordance with approved plans and has been inspected by their representative and is satisfactory.

(3) Certification that all ventilation fans for use in hazardous locations are of the nonsparking type.

(4) Certification that seals for gastight bulkhead penetrations are suitable for the intended service.

(5) Certification that the arrangement of gaslocks used to limit the extent of hazardous locations is acceptable.

8. For vessels intended to carry cargoes listed in this annex which reference paragraph 8, the owner, or owner's representative, must submit:

(a) A description of gas detection system instrumentation and alarms, including a general arrangement drawing which shows the locations of all sensing points.

9. For vessels intended to carry cargoes listed in this annex which reference paragraph 9, the owner, or owner's representative must submit:

(a) Translated copies of specifications for all grades of materials used for cargo tanks, piping, valves, flanges, bolting, and other appurtenances which may come into contact with the cargo. Copies of specifications for materials conforming to American Society for Testing and Materials (ASTM) or American Bureau of Shipping (ABS) standards need not be submitted.

10. For vessels intended to carry cargoes listed in this annex which reference paragraph 10, the owner or owner's representative, must submit:

(a) Cargo handling system.

(1) Translated copies of specifications for all grades of material used for piping, valves, fittings, flanges, bolting, etc. Copies of specification for materials conforming to American Society for Testing and Materials (ASTM) or American Bureau of Shipping (ABS) standards need not be submitted.

(2) Details of pipe scantlings, flange details, weld joint details, nondestructive testing, and post weld heat treatment.

11. For vessels intended to carry cargoes listed in this annex which reference paragraph 11, the owner or owner's representative, must submit:

(a) Cargo piping and venting plans which clearly indicate piping segregation. The use of spectacle flanges, blind flanges, or spool pieces is not acceptable.

(b) Details of cargo tank overfill protection.

12. For vessels intended to carry cargoes listed in this annex which reference paragraph 12, the owner or owner's representative, must submit:

(a) Translated copies of specifications for all grades of material used for tanks, piping, valves, fittings, flanges, bolting, etc. Copies of specifications for materials conforming to American Society for Testing and Materials (ASTM) or American Bureau of Shipping (ABS) standards need not be submitted.

(b) Specifications and plans of the installations and composition of tank linings and piping corrosion protection.

13. For vessels intended to carry cargoes listed in this annex which reference paragraph 13, the owner, or owner's representative, must submit:

(a) A description of the inert gas system and details of the automatic controls.

14. For vessels intended to carry cargoes listed in this annex which reference paragraph 14, the owner, or owner's representative, must submit:

(a) General arrangement drawings with the hazardous areas indicated. This drawing should show the location of all mechanical equipment and electrical instrumentation and devices within the hazardous areas.

(b) A list of all electrical instrumentation and devices and all mechanical equipment installed in the hazardous locations. This list must correspond to the general arrangement drawing and should give the following information for each piece of equipment:

(1) Location;

(2) Manufacturer and manufacturer's model number.

(c) Certification by the classification society or a recognized testing organization that each electrical device within the hazardous area has been tested as intrinsically safe in an explosive atmosphere of the specific cargo.

(d) Certification by the classification society that no equipment with a normal operating temperature above 115° F has been installed in the hazardous area.

ANNEX B

BULK LIQUID CARGOES NOT CONSIDERED TO INVOLVE POTENTIAL UNUSUAL OPERATING RISKS TO LIFE AND PROPERTY IN U.S. PORTS

Vessels transporting the following commodities in bulk do not require plan review and examination solely by reason of the cargo carried:

Acetone.
Amyl acetate.
Amyl alcohol.
Asphalt.
Butyl acetate (iso-, n-, sec-).
Butyl alcohol (iso-, n-, sec-, tert-).
Butyl benzyl phthalate.
Butylene glycol.
Butyric acid (n-).

- Corn syrup.
- Creosote, coal tar.
- Cumene.
- Cyclohexane.
- Cyclohexyl alcohol.
- p-Cymene.
- Decyl alcohol (iso-, n-).
- Decaldehyde (iso-, n-).
- Dextrose solution.
- Diacetone alcohol.
- Dicyclopentadiene.
- Diethylbenzene.
- Diethylene glycol.
- Diethylene glycol monobutyl ether.
- Diethylene glycol monoethyl ether.
- Diisobutyl carbinol.
- Diisobutylene.
- Diisobutyl ketone.
- Dioctyl phthalate.
- Diphenyl-diphenyl oxide.
- Dipropylene glycol.
- Dodecyl benzene.
- Ethoxytriglycol.
- Ethyl acetate.
- Ethyl alcohol.
- Ethyl benzene.
- 2-ethylbutyl alcohol.
- Ethylene glycol.
- Ethylene glycol monobutyl ether.
- Ethylene glycol monethyl ether.
- Ethylene glycol monoethyl ether acetate.
- Ethylene glycol monomethyl ether.
- 2-ethylhexyl acrylate (inhibited).
- 2-ethylhexyl alcohol.
- Ethylhexyl tallate.
- Furfuryl alcohol.
- Gasolines:
  - Casinghead (natural).
  - Automotive (containing not over 4.23 grams lead per gallon).
- Glycerine.
- Glycol diacetate.
- Heptane (n-).
- Hexane (iso-, n-).
- Hexylene glycol.
- Isooctyl alcohol.
- Isooctylaldehyde.
- Isophorone.
- Isopropyl ether.
- Jet fuels:
  - JP-1 (kerosene).
  - JP-3.
  - JP-4.
  - JP-5 (kerosene, heavy).
- Kerosene.
- Mesityl oxide.
- Methyl acetate.
- Methyl alcohol.
- Methyl amyl acetate.
- Methyl butyraldehyde.
- Methyl ethyl ketone.
- Methyl formal.
- Methyl isobutyl ketone.
- Mineral spirits.
- Molasses, all.
- Naphtha:
  - Coal tar.
  - Solvent.
  - Stoddard solvent.
  - VM&P (75% naphtha).
- Naphthalene, molten.
- Nonane.
- Nonene.
- Nonylphenol.
- Oils:
  - Crude oil.
  - Diesel oil.
  - Fuel oils:
    - No. 1 (kerosene).
    - No. 1-D.
    - No. 2.
    - No. 2-D.
    - No. 4.
    - No. 5.
    - No. 6.
  - Edible oils, including:
    - Castor.
    - Cottonseed.
    - Olive.
    - Peanut.
    - Soya bean.
    - Vegetable.
  - Miscellaneous oils, including:
    - Absorption.
    - Coal tar.
    - Lubricating.
    - Mineral.
    - Mineral seal.
    - Motor.
    - Neatsfoot.
    - Penetrating.
    - Range.
    - Resin.
    - Rosin.
  - Mineral oils, including:
    - Sperm.
    - Spindle.
    - Spray.
    - Tall.
    - Tanner's.
    - Turbine.
- Petrolatum.
- Petroleum naphtha.
- Polybutene.
- Polypropylene glycol methyl ether.
- Propylene tetramer (dodecene).
- Propionaldehyde.
- Propyl acetate (iso-, n-).
- Propyl alcohol (iso-, n-).
- Propylene glycol.
- Sorbitol.
- Tallow.
- Tetraethylene glycol.
- Tetrahydronaphthalene.
- Toluene.
- 1,2,4-trichlorobenzene.
- Tridecyl alcohol.
- Triethyl benzene.
- Triethylene glycol.
- Turpentine.
- Valeraldehyde.
- Waxes:
  - Carnauba.

Paraffin.

Xylene (meta-, ortho-, para-).

Zinc dialkyl dithiophosphate

(R.S. 4472, as amended, sec. 201, 86 Stat. 424, sec. 6(b)(1), 80 Stat. 937; 46 U.S.C. 170, 391a, 49 U.S.C. 1655(b)(1); 49 CFR 1.46 (b) and (o)(4); 14 U.S.C. 632; 46 U.S.C. 369, 375, and 416; 49 U.S.C. 1655(b); 49 CFR 1.46(b))

[CGD 72-80R, 38 FR 15776, June 15, 1973 as amended by CGD 72-80, 39 FR 24010 June 28, 1974; 39 FR 24632, July 5, 1974. Redesignated and amended by CGD 74-289, 4 FR 26008, May 3, 1979; CGD 82-063b, 48 F 4782, Feb. 3, 1983; CGD 88-070, 53 F 34535, Sept. 7, 1988]

PART 155—[RESERVED]

FINDING AIDS

A list of CFR titles, subtitles, chapters, subchapters and parts and an alphabetical list of agencies publishing in the CFR are included in the CFR Index and Finding Aids volume to the Code of Federal Regulations which is published separately and revised annually.

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(Revised as of October 1, 1990)

The Director of the Federal Register has approved under 5 U.S.C. 552(a) and 1 CFR Part 51 the incorporation by reference of the following publications. This st contains only those incorporations by reference effective as of the revision ate of this volume. Incorporations by reference found within a regulation are ffective upon the effective date of that regulation. For more information on corporation by reference, see the preliminary pages of this volume.

CFR SUBCHAPTER N
COAST GUARD, DEPARTMENT OF TRANSPORTATION

	46 CFR
erican Boat and Yacht Council, Inc. P.O. Box 806, Amityville, NY 11701	
ABYC H–25–81—Portable Fuel Systems and Portable Containers for Flammable Liquids, May 12, 1981.	147.7
erican Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. Publication Sales Department, 1791 Tullie Circle, NE, Atlanta, GA 30329	
ANSI/ASHRAE 34–78—Number Designation of Refrigerants, approved 1978.	147.7
tional Fire Protection Association Batterymarch Park, Quincy, MA 02269	
—Standard for Fumigation, 1973	147A.11
—National Electrical Code, 1981	146.29–35
val Publications and Forms Center Customer Service, Code 1052, 5801 Tabor Ave., Philadelphia, PA 9120	
Military Specifications:	
MIL–B–11886 Box, Metal, Shipping: Reusable, Transporter, Steel, Maximum Load 9,000 Lbs, K.	146.29–11; 146.29–90
MIL–B–21560 Box, Metal, Shipping: Reusable, Transporter, Steel, Type 1, Capacity 135 Cubic Feet, Maximum Load 9000 Lbs, B, Notice	146.29–11; 146.29–90
lic Health Service, Department of Health and Human Services uperintendent of Documents, U.S. Government Printing Office, ashington, DC 20402	
HS Publication No. (PHS) 84–2024—The Ship's Medicine Chest and edical Aid at Sea, revised 1984.	147.7
erwriters Laboratories, Inc. blications Stock, 333 Pfingsten Road, Northbrook, IL 60062	
30—Metal Safety Cans, 7th Ed., March 11, 1985, revised March 12, 85 and March 3, 1987.	147.7
1185—Portable Marine Fuel Tanks, Second Edition, March 13, 1978, vised July 6, 1984.	147.7

46 CFR SUBCHAPTER N—Continued
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	46 CFR
UL 1313—Nonmetallic Safety Cans for Petroleum Products, 1st Ed., March 15, 1982, revised January 3, 1984 and March 22, 1985.	147.7
UL 1314—Special Purpose Containers, 1st Ed., July 1983, revised February 7, 1984 and September 23, 1986.	147.7

46 CFR SUBCHAPTER O
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	46 CFR
American Bureau of Shipping	
45 Eisenhower Drive, Paramus, NJ 07652	
Rules for Building and Classing Steel Vessels, 1981	154.1
American National Standards Institute	
1430 Broadway, New York, NY 10018	
ANSI B16.5–77 Steel Pipe Flanges and Pipe Fittings	151.50–35; 153.940
ANSI B16.5–81, Pipe Flanges and Flanged Fittings	150.480(a)(2)
ANSI B16.11–73 Forged Steel Fittings, Socket-Welding and Threaded	151.50–10
ANSI B16.25–79 Butt-welded Ends—Pipe, Valves, Flanges, and Fittings.	151.50–10
ANSI B16.31–71 Non-Ferrous Pipe Flanges	150.480(a); 153.940
ANSI B31.1–80 Power Piping	151.20–1; 151.50–10
ANSI Z87.1–79 Practice for Occupational and Educational Eye and Face Protection.	150.395(g)(2); 150.457(b)(2); 154.1(b); 154.1400
ANSI Z88.2–80 Practice for Respiratory Protection	150.395(h); 150.457(b)(3); 150.460(b)(1)
ANSI Z89.1–69 Safety Requirements for Industrial Head Protection	154.1400
American Society of Mechanical Engineers	
United Engineering Center, 345 E. 47th St., New York, NY 10017	
Boiler and Pressure Vessel Code:	
Section VIII, Pressure Vessels, 1980	151.03–37
Section V, Nondestructive Examination (1986)	151.01–2
American Society for Nondestructive Testing (ASNT)	
P.O. Box 21142, Columbus, OH 43221	
Recommended Practice No. SNT–TC–1A (1988), Personnel Qualification and Certification in Nondestructive Testing.	151.01–2
American Society for Testing and Materials	
1916 Race St., Philadelphia, PA 19103	
ASTM A 20–78 General Requirements for Steel Plates for Pressure Vessels.	154.1; 154.610
International Maritime Organization (formerly Inter-Governmental Maritime Organization)	
IMO Sales, New York Nautical Instrument and Service Corp., 140 W. Broadway, New York, NY 10013	
Res. A212(VII) Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, 1977, with 8 amdts.	153.2
Res. A328(IX) Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, 1976.	154.1; 154.3
Code for Existing Ships Carrying Liquefied Gases in Bulk, 1976	154.1
International Convention on Safety of Life at Sea, 1974	154.3; 154.5; 154.1802
Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (no date).	153.930; 154.1; 154.1435; 154.1440

Material Approved for Incorporation by Reference

46 CFR SUBCHAPTER O—Continued
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	46 CFR
National Fire Protection Association Batterymarch Park, Quincy, MA 02269	
NFPA 306—1984 Control of Gas Hazards on Vessels	150.460(b)(1)
Underwriters Laboratories, Inc. 333 Pfingsten Road, Northbrook, IL 66062	
UL 783-79 Standard for Safety, Electric Flashlights for Use in Hazardous Locations, Class 1, Groups C and D, 1979.	154.1

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VII	Advisory Commission on Intergovernmental Relations (Parts 1700—1799)
VIII	Office of Special Council (Parts 1800—1899)
IX	Appalachian Regional Commission (Parts 1900—1999)
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XVI	Office of Government Ethics (Parts 2600—2699)

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Trade Representative, United States, Office of	15, XX
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United States Customs Service	19, I
United States Fish and Wildlife Service	50, I, IV
United States Information Agency	22, V; 48, 19
United States International Development Cooperation Agency	22, XII
United States International Trade Commission	19, II
United States Postal Service	39, I
United States Soldiers' and Airmen's Home	5, XI
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Redesignation Tables

At 48 FR 50996, Nov. 4, 1983, the Coast Guard established Subchapter S containing the subdivision and stability regulations for merchant vessels. Subchapter S regulations were transferred in part from various places throughout Title 46 and Title 33. For the convenience of the user, the following Derivation Table and Distribution Table II show the relationship of the old regulations to the new regulations in Subchapter S. Distribution Table I shows where certain old stability rules not contained in Subchapter S are being transferred. Abbreviations of referenced materials used in the tables below include: NVC for Navigation and Vessel Inspection Circular, MSM for Marine Safety Manual, MMTN for Merchant Marine Technical Note, and IMO Res. for International Maritime Organization Resolution. Numerical references are to regulations in Title 46 unless otherwise noted.

DERIVATION TABLE

New regulation	Old regulation	Other old regulations containing the same or similar requirement
170.001		31.10-30(a), 73.01-1, 74.01, 107.01, 107.111, 93.01-1, 167.20-5, 167.20-20, 168.05-5, 178.01, 179.01, 191.01, 153.806(a), 153.15, 153.16, 154.1, 73.90, 74.90, 93.07-90, 33 CFR 157.01.
170.005	30.01-10	179.15-1, 91.45.
170.010	108.105	30.15-1, 175.15, 90.15, 70.15, 188.15, 108.335(c), 153.10, 154.8, 33 CFR 157.07.
170.015	New	
170.050:		
(a)	New	
(b)		30.10-17, 70.10-9, 90.10-7, 151.03-15, 153.1, 175.10-5, 107.111, 167.05-10, 188.10-19.
(c)	178.05-15	
(d)	90.05-10(b)	30.10-33, 30.10-6(b), 151.03-29, 70.05-10(b), 70.10-17 175.10-11, 188.10-31, 93.20-1.
(e)	90.10-19	30.10-41, 70.10-23, 151.03-33, 175.10-17, 188.10-39.
(f)	175.10-25	30.10-45, 70.10-31, 151.03-39, 90.10-25, 188.10-51.
(g)	90.10-27	30.10-47, 70.10-33, 151.03-41, 175.10-26, 188.10-55.
(h)	33 CFR 157.03.	
(i)	178.05-17	
(j)	178.05-19	
(k)	175.10-33	70.10-39, 90.10-33, 151.03-45, 188.10-61, 30.10-61.
170.055:		
(a)	175.10-38	
(b)	90.10-2	30.10-65, 70.10-2, 151.03-7, 175.10-23, 188.10-5.
(c)	33 CFR 157.03.	73.05-4, 153.4, 191.05-4.
(d)	178.05-1	73.05-5, 191.05-5.
(e)	108.301(c)	
(f)	108.301(d)	
(g)	73.05-7	191.05-7.
(h)		42.13-5, 73.05-3, 153.2, 154.3, 175.10-19, 191.05-3, 33 CFR 157.03.
(i)	33 CFR 157.03.	30.10-38, 31.10-30(f)(1).
(j)	New	
(k)	73.05-8	33 CFR 157.03, 154.3, 153.30(a), 191.05-8.
(l)	175.10-36	70.10-42.
(m)	New	
(n)	30.10-69	
(o)	30.10.65	
(p)	30.10-67	
(q)		70.10-45, 90.10-37, 151.03-55.
(r)	(New)	
170.070	107.301	31.10-5(a), 71.65-1, 189.55-1, 91.55-1, 167.20-25, 168.05-5, 179.01-1.
170.075:		
(a)(1)	107.305(b)	71.65-5(a)(2), 167.20-25(a)(1) and (c), 177.05-1(a)(4), 189.55-5(a), 91.55-5(a)(2), 168.05-5, 31.10-5(a), 33 CFR 157.24(b), 154.4, 153.8.
(a)(2)	107.305(q)	71.65-5(c)(1), 167.20-25(a)(3) and (c), 177.05-3(a)(1), 189.55-5(c)(1), 91.55-5(c)(1), 168.05-5, 31.10-5(a), 33 CFR 157.24(b), 154.4, 153.8.

DERIVATION TABLE—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
(a)(3)	107.305(r)	71.65-5(c)(2), 167.20-25(a)(4) and (c), 177.05-3(a)(2), 189.55-5(c)(2), 91.55-5(c)(2), 168.05-5, 31.10-5(a), 33 CFR 157.24(b), 154.4, 153.8.
(a)(4)	107.305(s)	71.65-5(c)(5), 167.20-25(b) and (c), 177.05-3(a)(3), 189.55-5(c)(3), 91.55-5(c)(3), 168.05-5, 31 10-5(a) 33 CFR 157.24(b), 154.4, 153.8.
(a)(5)	107.305(t)	71.65-5(c)(6), 167.20-25(b) and (c), 189.55-5(c)(4), 91.55-5(c)(4), 168.05-5, 31.10-5(a), 33 CFR 157.24(b), 154.4, 153.8.
(a)(6)	107.305(u)	71.65-5(c)(7), 167.20-25(b) and (c), 189.55-5(c)(5), 91.55-5(c)(5), 168.05-5, 31.10-5(a), 33 CFR 157.24(b), 154.4, 153.8.
(b)	177.05-1	
170.080	107.305(ii)	177.05-3(b), 191.30-1(b), 168.05-5, 31.10-5(b), 74.20-1(b), 93.10-1(a).
170.085	108.337	93.05-5(a) and (b), 74.05-5(a) and (b), 191.15-5(a), 153.806, 154.205(a), 167.20-25(b), 168.05-5, 31.10-30(b)(2).
170.090		177.05-3(b), (d), and (e), 71.65-5(c)(3) and (4), 167.20-25(b), 168.05-5, 31.10-5(a), 107.305(u-1), 191.20-15(b)(8), 108.329, 108.313, 91.55-5(c), 33 CFR 157.24(b).
170.093	New	
170.095	MMTN 3-69	
170.100	107.317	71.65-15, 177.05-1(a), 177.05-3(a) 189.55-15, 91.55-20, 167.20-25(c), 168.05-5.
170.105	179.01-1	
170.110:		
(a)	109.121(a)	74.20-1(a), 74.20-15(a) and (b), 93.10-1(a), 154.1809(a), 153.806(b), 191.30-1(a), 154.205(a), 153.806(a), 168.05-5, 31.10-30(b)(4), 167.20-20, 191.30-15.
(b)	109.121(b)	74.20-1(b), 93.10-1(a), 191.30-1(b), 154.205(a), 31.10-30(b)(4), 168.05-5, 167.20-20, 153.806(a).
(c) and (d)	109.121(d)	74.20-1(a), 74.20-15(a), 154.1809(b), 191.30-15(a), 154.205(a), 168.05-5 31.10-30(b)(4), 167.20-20, 153.806(a), 74.20-5, 93.10-1(a) and (b), 154.1809(c), 191.30-1(a), 153.806(b), 74.20-10, 191.30-10.
(e)	New	

DERIVATION TABLE—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
170.120:		
(a)	74.25-1	31.10-30(b)(5), 179.20(a) and (b), 191.35-1, 191.35-5, 154.205(a), 31.10-30(b)(4), 168.05-5, 153.806(a), 167.20-20, 93.15-1, 93.15-5.
(b)	New	
170.125	MMTN 3-69	
170.135:		
(a)	109.121(d)(6)	
(b)	109.121(d)(6)	
170.130:		
(a)	74.12-11	
(b)	74.12-7	
(c)	74.12-3	
170.160		31.10-30(a)(1), 74.01-1, 179.01-1, 93.01-1, 93.07-1, 153.806, 154.205(a), 167.20-20, 168.05-5, 191.20-5, MMTN 3-69.
170.170:		
(a)	74.10-5	31.10-30(b)(3), 93.07-10, 153.806(a), 154.205(a), 167.20-20, 168.05-5, 179.10-5, 191.20-5.
(b)	74.10-5	31.10-30(b)(3), 93.07-10, 153.806(a) 154.205(a), 167.20-20, 168.05-5, 179.10-5, 191.20-5.
(c)	MMTN 3-68	
(d)	74.10-1	31.10-30(b)(3), 93.07-15, 153.806(a), 167.20-20, 168.05-5, 179.10-5, 191.20-10.
170.173	New	NVC 3-73, IMO Res. A469(XII).
170.174		93.05-1(a), 74.05-1(a), 167.20-20, 31.10-30(b)(1), 168.05-5, 179.05-1, 191.15-1, 154.205(a), 153.806, 93.01-1, 108.335.
170.175:		
(a)	108.335(a)	93.05-1(a), 74.05-1(a), 191.15-1(a), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(1), 179.10-3.
(b)	108.335(b)	93.05-1(a), 74.05-1(a), 191.15-1(a), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(1), 179.10-3.
(c)	108.338(c)	93.05-1(b), 74.05-1(b), 191.15-1(b), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(1), 179.10-3.
(d)	93.05-1	
170.180	74.05-(a)&(b).	93.05-5(a) and (b), 108.337, 153.806, 191.15-5(a), 154.205(a), 168.05-5, 167.20-25(a), 31.10-30(b)(1), 179.10-3, 179.10-5, 189.55-5(c).

DERIVATION TABLE—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
170.185:		
(a)	108.339(a)	93.05-5(c)(3), 74.05-5(c)(3), 191.15-5(b)(3), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(2), 179.10-3, 179.10-5.
(b)	108.339(b)	93.05-5(c)(2), 74.05-5(c)(2), 191.15-5(b)(2), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(2), 179.10-3, 179.10-5.
(c)	108.339(c)	93.05-5(c)(4), 74.05-5(c)(4), 191.15(b)(4), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(2), 179.10-3, 179.10-5.
(d)	108.339(d)	93.05-5(c)(5), 74.05-5(c)(5), 191.15-5(b)(5), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(2), 179.10-3.
(e)	108.339(e)	93.05-5(c)(5), 74.05-5(c)(5), 191.15-5(b)(5), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(2), 179.10-3.
(f)	108.339(f)	
(g)	108.339(g)	
170.190	108.341	93.05-5(c)(1), 74.05-5(c)(1), 191.15-5(b)(1), 153.806, 154.205(a), 167.20-20, 168.05-5, 31.10-30(b)(2), 179.10-3, 179.10-5.
170.200		31.10-30(c) through (f).
170.235	74.15-5	168.05-5, 191.25-5, 93.13-5, 109.581 153.806(a) 154.205(a), 167.20-30.
170.245	MMTN 4-67	178.10-1.
170.248	New	
170.250:		
(a)	73.35-1(a)	167.20-5, 168.05-5, 191.10-25(b)
(b)	73.35-1(a)	167.20-5, 168.05-5, 191.10-25(b)
(c)	73.35-1(b)	167.20-5, 168.05-5.
(d)	73.35-17	
170.255:		
(a)	73.35-5(a)	167.20-5, 168.05-5, 191.10-25(c).
(b)	73.35-5(b)	167.20-5, 168.05-5.
(c)	New	
170.260:		
(a)	73.35-10(a)	167.20-5, 168.05-5, 191.10-25(d)(1).
(b)	73.35-10(b), 73.35-10(c).	167.20-5, 168.05-5, 191.10-25(d)(2).
(c)	73.35-10(b)	167.20-5, 168.05-5, 191.10-25(d)(2).
(d)	73.35-10(b)	167.20-5, 168.05-5, 191.10-25(d)(2).
170.265:		
(a)	73.35-15(a)	167.20-5, 168.05-5.
(b)	73.35-15(b)	167.20-5, 168.05-5, 191.10-25(e).
(c)	73.35-15(c)	167.20-5, 168.05-5, 191.10-25(e).
(d)	73.35-15(d)	167.20-5, 168.05-5.
170.270:		
(a)	73.35-20(a)	167.20-5, 168.05-5.
(b)	73.35-30(b)	167.20-5, 168.05-5, 191.10-25(f)(2).
(c)	73.35-30(c)	167.20-5, 168.05-5, 191.10-25(f)(3).
(d)	73.35-25(a)	167.20-5, 168.05-5, 191.10-25(f)(3).
170.275:		
(a)	73.35-17(a)	167.20-5, 168.05-5.
(b)	73.35-17(b)	167.20-5, 168.05-5.
(c)	73.35-17(a)	167.20-5, 168.05-5.
170.285	154.225	31.10-30(b)(3), 151.10-15(b), 153.31, 74.10-1, 167.20-20, 168.05-5, 191.20-1, 93.07-5, 93.20-05(c).
170.290	154.225	31.10(b)(3), 151.10-15(b), 153.31, 74.10-1, 167.20-20, 168.05-5, 191.20-1, 93.07-5, 33 CFR 157, App. B, paragraphs 4 (d) & (e), 93.20-05(c).
170.295	MMTN 2-69	
170.001	New	
171.010:		
(a)	178.05-9	
(b)	73.05-2	191.05-2
(c)	New	
(d)		70.10-15, 175.10-9
(e)	73.05-12	
(f)	178.05-7	
(g)	73.05-10	
(h)	73.05-10	
(i)	178.05-13	
(j)	73.05-11	
(k)	New	
(1)	70.10-43	
(m)	New	
(n)	178.05-11	
171.015:		
(a)	73.05-6(a)	167.20-5, 168.05-5, 191.05-6(b).
(b)	73.05-6(b)	167.20-5, 168.05-5, 191.05-6(a).
(c)	73.05-6(a)	167.20-5, 168.05-5, 191.05-6(a).
(d)	73.05-6(a)	167.20-5, 168.05-5, 191.05-6(a).
171.017	178.10-1	
171.020		175.05-5(a), 178.01-1, 178.10-1, 178.10-5, 178.10-10, 179.01-1.
171.030:		
(a)		179.05, 179.10-3(a).
(b)		179.10-1(a), 179.10-1(b), 179.10-1(c).
(c)		179.10-1(d), 179.10-1(e).
(d)		179.10-1(f), 179.10-1(g).
(e)	179.10-1(f)-(g).	
(f)	179.10-1(f)	
(g)	179.10-1(h)	
(h)	179.10-1(f)	
171.035	MMTN 3-68	
171.040:		
(a)		178.10-1(a), 178.10-1(c), 178.20-1(b).
(b)		178.10-5(a), 178.10-5(b), 178.10-10.

DERIVATION TABLE—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
(c)	178.25-1(b)	
(d)	178.15-5	
171.043:		
(a)	178.20-1(a)	
(b)	178.20-1(a)	
171.045		175.05-5(a) & (b), 178.01-1, 178.10-1, 178.20-5, 179.01-1, 70.05-1(a), 73.01-1, 74.01-1, 73.10-1.
171.050	74.10-10	179.10-5.
171.055	MMTN 3-68	
171.057	MMTN 1-69	
171.060:		
(a)		73.10-1(a), 73.10-2, 73.12-1, 74.10-2.
(b)		178.20-5, 73.15 (title).
(c)		73.20-1(a), 178.10-1(a).
(d)	73.20-1(a)	178.15-15.
171.065:		
(a)		73.10-10, 73.10-15, 73.10-20.
(b)	73.10-23	73.10-15, 73.10-20.
(c)	73.10-30(a)	
(d)	73.10-35	
(e)	73.10-55	
(f)	73.10-60	
(g)	73.10-60	
(h)	73.10-60	
(i)	New	
(j)	New	
171.066:		
(a)		73.10-5(a), 73.10-5(b)(1), 73.10-5(c)(1), 73.10-30(b).
(b)	73.10-5(b)(2)	
(c)	73.10-5(d)	
(d)	73.10-5(e)	
171.067:		
(a)	New	
(b)	73.10-40	
(c)	73.10-45	
(d)	73.10-45	
(e)	73.10-55	
(f)	73.10-50	
171.068:		
(a)		73.10-65(a), 73.10-65(b)(1) and (2) 73.10-1(b).
(b)		73.10-65(b)(2)(i).
(c)		73.10-65(b)(2)(ii).
171.070:		
(a)	73.15-5(b)-(f).	
(b)	73.15-10(a)-(c).	
(c)	73.15-10(a)	
(d)	73.15-10(a)	
(e)	73.15-15, New.	178.20-5(b)
(f)	73.15-15	178.20-5(b)
171.072	73.15-1	
171.073:		
(a)	73.15-20	
(b)		73.15-25(a) and (b).
(c)	73.15-30	
171.075:		
(a)	73.12-5	
(b)	73.12-7	
(c)	73.12-3	
171.080:		
(a)		74.10-15(a) and (b), 179.10-5.
(b)	74.10-15(c)(4).	179.10-5.
(c)	74.10-15(c)(3).	179.10-5.
(d)	74.10-15(c)(7).	179.10-5.
(e)	74.10-15(c)(5).	179.10-5.
171.082:		
(a)	74.10-2	74.12-1, 74.12-5.
(b)	74.12-7	
(c)	74.12-3	
(d)	74.12-9	
171.085:		
(a)	New	
(b)	73.20-1(a)	
(c)	73.20-1(a)	
(d)	73.20-1(a)	
(e)	73.20-1(b)	
(f)	73.20-1(b)	
(g)	73.20-1(c)	73.30-15(a)(1).
(h)	178.15-3	
(i)	178.15-3	
(j)	178.15-1	
171.090		73.20-10, 178.15-5.
171.095	73.20-5	
171.100:		
(a)	73.20-15	
(b)	73.30-25(b)	
(c)	73.30-25(b)	
(d)	73.30-25(b)	
171.105:		
(a)	73.25-1	
(b)	73.25-5(b)	
(c)	73.25-5(c)	
(d)	73.25-5(d)	
(e)	73.25-5(e)	
(f)	73.25-5(e)	
(g)	73.25-5(f)	
(h)	73.25-5(g)	
171.106	73.25-10	
171.108	73.25-15	
171.109	73.25-20	
171.110	New	
171.111:		
(a)	73.30-1	
(b)	73.30-35	
(c)	73.30-1	
(d)	73.30-10	
(e)	73.30-5	
(f)	73.30-40	
(g)	73.30-40	
(h)	73.30-15(a)(2).	
171.112:		
(a)	73.30-25(a)	
(b)	73.30-25(b)	
171.113:		
(a)	New	
(b)	73.30-30(b)	
(c)	73.30-30(a)	
171.114:		
(a)	178.25-1(c)	
(b)	178.25-1(d)	
(c)	178.25-1(b)	
171.115	New	

Derivation Table—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
171.116:		
(a)	73.40-5(a)	
(b)	73.40-5(b)(1)	
(c)	73.40-5(b)(1)	
(d)	73.40-5(b)(3)	
(e)	73.40-5(b)(4)	
(f)		73.40-5(b)(2), 73.40-5(b)(5).
171.117:		
(a)	73.40-5(c)(1)	
(b)	73.40-5(c)(1)	
(c)	73.40-5(c)(1)	
(d)	73.40-5(c)(2)	
171.118:		
(a)	73.40-10	
(b)	73.40-15	
(c)	73.40-15	
171.119:		
(a)		178.40-1(b) and (c).
(b)	178.40-1(d)	
(c)	178.40-1(e)	
(d)	178.40-1(e)	
(e)	178.40-1(d)	
(f)	178.40-1(d)	
171.120	New	
171.122:		
(a)	New	
(b)	73.45-5(a)	
(c)	73.45-1(a)	
(d)	73.45-1(b)	
(e)	73.45-1(b)	
(f)	73.45-5(b)	
(g)	73.45-10(b)	
171.124:		
(a)		178.35-1(a), (b), and (c).
(b)	178.35-1(d)	
(c)	178.35-1(e)	
(d)	178.35-1(f)	
(e)	178.35-1(f)(1).	
171.130	New	
171.135	73.45-5(c)	
171.140	178.30-1	
171.145:		
(a)	178.30-3(a)	
(b)	178.30-3(b)	
(c)	178.30-3(b)	
(d)	178.30-3(c)	
(e)	178.30-3(d)	
(f)	178.30-3(d)	
171.150:		
(a)	178.30-5(a)	
(b)		178.30-5(b), (c), and (d).
(c)	178.30-5(b)	
(d)	178.30-5(b)	
171.155	178.30-7	
172.005		93.20-01, 30.25-1- 151.01-10(b), 153.5, 154.2, 153.806(a), 154.205(a), 33 CFR 157.08.
172.047	32.63-1	
172.050:		
(a)	32.63-5	
(b)	32.63-15(b)	
(c)	32.63-15(b)	
(d)	32.63-15(b)	
(e)	32.63-15, New.	
(f)	New	

Derivation Table—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
172.060		33 CFR 157.01, 157.08, 157.21.
172.065:		
(a)	33 CFR 157.03(a).	
(b)	33 CFR 157.21.	
(c)		33 CFR 157—Appendix B—para. (2).
(d)		33 CFR 157—Appendix B—para. (3)(a), para. (3)(c), and para. (3)(d).
(e)		33 CFR 157—Appendix B—para. (3)(b).
(f)		33 CFR 157—Appendix B—para. (4)(a)-(b).
(g)(1)	33 CFR 157.21(a).	
(g)(2)	33 CFR 157.21(b).	
(g)(3)	33 CFR 157.21(c).	
(g)(4)		33 CFR 157—Appendix B—para. (3)(e).
(h)		33 CFR 157—Appendix B—para. (4)(c).
172.080	151.01-10	
172.085	New	
172.087	151.10-15(b)	
172.090:		
(a)	151.10-5(a)	
(b)	151.10-5(b)	
(c)	151.10-5(b)	
(d)	151.10-5(a)	
172.095	151.10-6	
172.100:		
(a)		151.10-10(a)(1).
(b)		151.10-10(a)(1).
(c)		151.10-10(a)(1).
172.103	New	
172.104:		
(a)		151.10-10(a)(2).
(b)		151.10-10(a)(2).
(c)		151.10-10(a)(3).
172.105:		
(a)(1)		151.10-10(b)(2).
(a)(2)		151.10-10(b)(1).
(a)(3)	New	
(b)		151.10-10(b)(3).
172.110:		
(a)	New	
(b)	New	
(c)		151.10-10(c)(1).
(d)		151.10-10(c)(1).
(e)		151.10-10(c)(2).
(f)		151.10-10(c)(2).
(g)		151.10-10(c)(2).
(h)		151.10-10(c)(2).
(i)		151.10-10(c)(2).
172.125	153.1	
172.127	153.2	
172.130:		
(a)		153.15, 153.16, 153.20 through 22.
(b)	153.5	
172.133:		
(a)	153.20	
(b)	153.21	
(c)	153.22	

DERIVATION TABLE—Continued

New regulation	Old regulation	Other old regulations containing the same or similar requirement
(d)	153.32(c)	
172.135:		
(a)	153.32(a)	
(b)	153.32(a)	
172.140:		
(a)	153.30(b)	
(b)	153.30(b)	
(c)	153.30(c)	
172.150:		
(a)	153.34(b)	
(b)	153.34(a)	
(c)	153.34(c)	
(d)	153.34(f)	
(e)	153.34(e)	
(f)	153.34(d)	
(g)	153.34(g)	
(h)	153.34(h)	
172.155		154.1, 154.2.
172.160:		
(a)	154.3	
(b)	154.3	
172.165	154.205(b)	
172.170:		
(a)	154.210(a)	
(b)	154.210(b)	
172.175:		
(a)	154.215(a)	
(b)	154.215(b)	
(c)	154.215(c)	
(d)	154.215(d)	
(e)	154.215(e)	
(f)	154.215(e)	
172.180:		
(a)	154.220(a)	
(b)	154.220(b)	
172.185:		
(a)	154.225(d)	
(b)	154.225(c)	
(c)	154.225(e)	
172.195:		
(a)	154.230(b)	
(b)	154.230(a)	
(c)	154.230(c)	
(d)	154.230(h)	
(e)	154.230(e)	
(f)	154.230(d)	
(g)	154.230(g)	
(h)	154.230(h)	
172.205	154.230(f)	
173.001	New	
173.005	New	
173.007 through 173.025.	MMTN 3-69	
173.050	167.20-5	
173.055	167.20-5	
173.060	168.05-5	
173.070		191.01-1, 188.05-1.
173.075:		
(a)		191.10-1, 191.10-5, 191.10-10, 191.10-13.
(b)	191.10-15	
173.080		191.20-15(a), (b)(1)-(7), and (c).
173.085:		
(a)	-	191.10-15(a), 191.10-20(e).
(b)	191.10-16	
(c)	191.10-17	
(d)	191.10-18	
(e)	191.10-19	
(f)		191.10-20(a)-(c) and (f).
(g)	191.10-20(g)	
(h)		191.10-20(b)(2).
(i)	191.10-30(b)	
(j)		191.10-30(c)(2).
(k)		191.10-30(c)(1).
(l)	191.10-30(d)	
(m)	191.10-35	
(n)		191.10-35(b)(2).
(o)	191.10-20(d)	
173.090	65-4-C MSM.	
173.095	65-4-C MSM.	
174.005		93.07-15, 107.01.
174.010 through 174.020.	MMTN 3-69	
174.030	107.01	
174.035:		
(a)	107.111	
(b)	108.301	
174.040	108.303	
174.045:		
(a)	108.305(a)	
(b)	108.305(b)	
(c)	108.305(c)	
(d)	108.305(d)	
174.050	108.309	
174.055:		
(a)	108.311(a)	
(b)	108.311(b)	
(c)	108.311(c)	
174.065:		
(a)	108.315(a)	
(b)	108.315(b)	
174.070:		
(a)	108.317(a)	
(b)	108.317(b)	
174.075	108.319	
174.080:		
(a)	108.321(a)	
(b)	108.321(b)	
174.085:		
(a)	108.323(a)	
(b)	108.323(b)	
174.090	108.325	
174.100		108.114, 108.115 .
174.110	79.01-1	37.01-1, 99.01-1.
174.115	79.05-5(a)	37.05-5(a), 99.05-5(a).
174.120	79.05-5(a)	37.05-5(a), 99.05-5(a).
174.125	79.05-5(a)-(b).	37.05-5(a)-(b), 99.05-5(a)-(b).
174.140	65-4-C MSM.	
174.145	65-4-C MSM.	
174.150	106.400(a)	
174.155	106.400(a)	
174.160	106.400(b)	
174.165	106.403	
174.170	106.405	

DISTRIBUTION TABLE I

Old rule	New location in 46 CFR
73.35–20(d)	163.001–4.
73.40–5(b)(4)	78.16–1.
74.10–12	72.30–5.
74.25–1(a)	78.12–1.
93.15–1	97.11–1.
179.20–1	185.12–1.
191.25–10	196.18–1.
191.35–1	196.12–1.

DISTRIBUTION TABLE II

Old regulation	New regulation
31.10–30:	
(a)(1)	170.160, 170.001.
(a)(2)	170.001.
(b)(1)	170.175, 170.174.
(b)(2)	170.085, 170.185, 170.190.
(b)(3)	170.170.
(b)(4)	170.110, 170.120.
(b)(5)	170.120.
(c)	170.200.
(d)	170.200.
(e)	170.200.
(f)(1)	170.055(i).
(f)(2)	170.200.
32.63–1	172.047, 172.050.
32.63–15	172.047, 172.050.
37.05–5	174.110–174.125.
71.65–5	170.075, 170.090.
73.01–1	170.001, 171.045.
73.05–1	Deleted—unnecessary.
73.05–2	171.010(b).
73.05–3	170.055(h)(1).
73.05–4	170.055(c).
73.05–5	170.055(d).
73.05–6	171.015.
73.05–7	171.055(g).
73.05–8	170.055(k).
73.05–9	Deleted—unnecessary.
73.05–10	171.010(h).
73.05–11	171.010(j).
73.05–12	171.010(e).
73.10–1:	
(a)	171.045, 171.060.
(b)	171.068.
73.10–2	171.060.
73.10–3	Deleted—unnecessary.
73.10–5	171.066.
73.10–10	171.065(a).
73.10–15	171.065 (a) and (b).
73.10–20	171.065 (a) and (b).
73.10–23	171.065(b).
73.10–25	171.015(d).
73.10–30:	
(a)	171.065(c).
(b)	171.066(a).
73.10–35	171.065(d).
73.10–40	171.067(b).
73.10–45	171.067 (b) and (c).
73.10–50	171.067(f).
73.10–55	171.065(e), 171.067(e).
73.10–60	171.065(f).
73.10–65	171.068.
73.12–1	171.060.
73.12–3	171.075(c).
73.12–5	171.075(a).
73.12–7	171.075(b), 170.015.
73.12–9	Deleted—unnecessary.
73.15–1	171.072.
73.15–5:	
(a)	Deleted—unnecessary.
(b)–(f)	171.070(a).
73.15–10	171.070(b)–(d).
73.15–15	171.070(e).
73.15–20	171.073(a).
73.15–25	171.073(b).
73.15–30	171.073(c).
73.20–1	171.085.
73.20–5	171.095.
73.20–10	171.090.
73.20–15	171.100(a).
73.25–1	171.105(a).
73.25–5:	
(a)	Deleted—unnecessary.
(b)	171.105(b).
(c)	171.105(c).
(d)	171.105(d).
(e)	171.105 (e) and (f).
(f)	171.105(g).
(g)	171.105(h).
73.25–10	171.106.
73.25–15	171.108.
73.25–20	171.109.
73.30–1	171.111(c).
73.30–5	171.111(e).
73.30–10	171.111(d).
73.30–15	171.111(h), 171.085(g).
73.30–20	Deleted—unnecessary.
73.30–25:	
(a)	171.112(a).
(b)	171.112(b).
73.30–30	171.113 (b) and (c).
73.30–35	171.111(b).
73.30–40	171.111 (f) and (g).
73.35–1	170.250.
73.35–5	170.255.
73.35–10	170.260.
73.35–15	170.265.
73.35–17	170.275.
73.35–20(a)	170.270(a).
73.35–20(b)–(c)	Deleted—repetitious.
73.35–25(a)	170.270(d).
73.35–25(b)	Deleted—repetitious (see Table I).
73.35–30(a)	Deleted—unnecessary.
73.35–30 (b) and (c)	170.270.
73.40–1	Deleted—unnecessary.
73.40–5:	
(a) and (b)	171.116.
(c)	171.117.
73.40–10	171.118(a).
73.40–15	171.118 (b) and (c).
73.40–20	Deleted—unnecessary.
73.45–1	171.122(c)–(e).
73.45–5:	
(a)	171.122(b).
(b)	171.122(f).
(c)	171.135.
73.45–10	171.122(g).
73.90	170.001(b).
74.01–1	170.001, 171.045.
74.05–1	170.175.
74.05–5:	
(a) and (b)	170.180, 170.085.
(c)	170.185, 170.190.
74.10–1	170.020.
74.10–2	171.060.

DISTRIBUTION TABLE II—Continued

Old regulation	New regulation
74.10-5	170.170.
74.10-10	171.050.
74.10-11	170.170(d).
74.10-15:	
(a)	171.080(a).
(b)(1)	171.080(a).
(b)(2)	Deleted—unnecessary.
(c)(1)	Deleted—unnecessary.
(c)(2)	Deleted—unnecessary.
(c)(3)	171.080(c).
(c)(4)	171.080(b).
(c)(5)	171.080(e).
(c)(6)	171.080(d).
(c)(7)	171.080(d).
(c)(8)	171.080(d).
(c)(9)	171.080(d).
(d)(1)	Deleted—unnecessary.
(d)(2)	Deleted—unnecessary.
74.10-20	Deleted—unnecessary.
74.12-1	171.060.
74.12-3	171.082(c).
74.12-5	171.082(a).
74.12-7	171.082(b).
74.12-9	171.082(d).
74.12-11	170.135(a).
74.15-1	Deleted—unnecessary.
74.15-5	170.235.
74.20-1	170.110.
74.20-5	170.110.
74.20-10	170.110.
74.20-15	170.110.
74.25-1	170.120.
74.90-1	170.001(b).
79.05-5	174.110–174.125.
91.55-5(c)	170.075.
93.01-1	170.001.
93.05-1	170.175.
93.05-5	170.180, 170.185.
93.07-1	170.160.
93.07-5	170.020.
93.07.10	170.170.
93.07-15	170.170.
93.07-90	170.001(b).
93.10-1	170.110.
93.13-1	Deleted—unnecessary.
93.13-5	170.235.
93.15-5	170.120.
99.05-5	174.110–174.125.
106.400	174.150, 174.155, 174.160.
106.403	174.165.
106.405	174.170.
107.305	170.075, 170.090.
108.114	174.100.
108.115	174.100.
108.301	174.035(b), 170.055(c)–(d).
108.303	174.040.
108.305	174.045.
108.309	174.050.
108.311	174.055.
108.313	170.090.
108.315	174.065.
108.317	174.070.
108.319	174.075.
108.321	174.080.
108.323	174.085.
108.325	174.090.
108.329	170.090.
108.335	170.174, 170.175.
108.337	170.180.
108.339	170.185.
108.341	170.190.
108.343	170.005.
109.121	170.110, 170.130.
109.581	170.235.
151.10-5	172.090.
151.10-6	172.095.
151.10-10:	
(a)	172.100, 172.104.
(b)	172.105.
(c)	172.110.
151.10-15:	
(a)	Deleted—unnecessary.
(b)	172.087.
153.20	172.130, 172.133(a).
153.21	172.130, 172.133(b).
153.22	172.130, 172.133(c).
153.30	170.055(k), 172.140.
153.31	170.285, 170.290.
153.32(a)	172.135.
153.32(b)	Deleted—unnecessary.
153.32(c)	172.133(d).
153.34	172.150.
153.35	Deleted—unnecessary.
153.806(a)	170.001, 170.085, 170.110, 170.120, 170.160, 170.170, 170.175, 170.180, 170.185, 170.235, 172.005, 172.015, 172.030.
153.806(b)	170.110.
154.200	170.020.
154.205(a)	170.001, 170.085, 170.110, 170.120, 170.160, 170.170, 170.175, 170.180, 170.185, 170.235, 172.005, 172.015, 172.030.
154.205(b)	172.165.
154.210	172.170.
154.215	172.175.
154.220	172.180.
154.225:	
(a) and (b)	170.285.
(c)–(e)	172.185.
154.230	172.195.
154.1809	170.110.
167.20-5	173.050, 173.055.
167.20-20	170.110, 170.120, 170.170, 170.160, 170.174, 170.175, 170.185, 170.190.
167.20-25(a)	170.180.
167.20-25 (b) and (c).	170.070, 170.075, 170.080, 170.085, 170.090, 170.100.
167.20-30	170.235.
167.20-35	Deleted—unnecessary.
168.05-5	173.060, 170.070, 170.075, 170.080, 170.085, 170.090, 170.100, 170.110, 170.120, 170.160, 170.170, 170.174, 170.175, 170.180, 170.185, 170.190, 170.235, 170.250, 170.255, 170.260, 170.265, 170.270, 170.285, 170.290.
175.05-5	171.020, 171.045.
177.05-3	170.075, 170.090
178.10-1	171.017, 171.045, 171.040.
178.10-5	171.040.
178.10-10	171.040.
178.15-1	171.085.
178.15-3 (a)–(b)	171.085.
178.15-5	171.090.
178.20-1	171.040, 171.043.
178.20-5	171.060.
178.25-1	171.114.

DISTRIBUTION TABLE II—Continued

Old regulation	New regulation
178.30-1	171.140.
178.30-3	171.145.
178.30-5	171.150.
178.30-7	171.155.
178.35	171.124.
178.40-1	171.119.
179.05-1	170.174, 171.030.
179.10-1	171.030.
179.10-3	171.030, 170.175, 170.180, 170.185, 170.190.
179.10-5	170.170, 170.180, 170.185, 170.190, 171.050, 171.080.
179.15-1	170.005.
179.20-5	170.120.
189.55-5(c)	170.180.
191.01-1	173.070.
191.05-1	Deleted—unnecessary.
191.05-2	171.010(b).
191.05-3	170.055(h).
191.05-4	170.055(c).
191.05-5	170.055(d).
191.05-6	171.015.
191.05-7	171.055(g).
191.05-8	170.055(i).
191.10-1	173.075.
191.10-5	173.075.
191.10-10	173.075.
191.10-13	173.075.
191.10-15	173.075, 173.080, 173.085.
191.10-16	173.085(b).
191.10-17	173.085(c).
191.10-18	173.085(d).
191.10-19	173.085(e).
191.10-20	173.085(f)-(h).
191.10-25	170.250, 170.255, 170.260, 170.265, 170.270.
191.10-30	173.085(i).
191.10-35	173.085 (m) and (n).
191.15-1	170.174, 170.175.
191.15-5(a)	170.180.
191.15-5(b)	170,185.
191.20-1	170.020.
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